			Sheet 1 of 3						
DATE _	10/	10/1	4 SURFACE ELEVATION 32.6 LOCATION	ON		See Pl	ate 2		
DEPTH, FT.	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
10— 15— 20— 35— 40—	15 6 12 6 8 6 17 30	AU AU AU SS	Asphalt Pavement (approx. 3" to 6") and Coarse Aggregate Subgrade (approx. 6") Brown silty coarse to fine SAND and coarse to fine GRAVEL, with cobble to boulder sized debris (concrete) (Fill) Firm to stiff gray fine sandy clayey SILT (Fine Grained Alluvial Soil) Medium dense to dense gray to brown silty fine SAND trace clay (Coarse Grained Alluvial Soil) Medium dense gray micaceous silty medium to fine SAND (Residual 1 Soil) Dense to very dense gray micaceous silty medium to fine SAND	31.6 27.1 17.1 13.6		Ò			Ю
Completic Project N Project N Project N	47	SS	Continued on Sheet 2 of 3 (Residual 2 Soil)						
Completion	on Depth:			epth:					
Project N			0000621	_N	otes				
Project N	ame:		-						
ទ្ធី Drilling M	ethod: _		Hollow Stem Augers- Auto Hammer			ft., Af	ter		_ hrs.

LOG of BORING No. B-1									of 3
DATE _	10/	10/1	4 SURFACE ELEVATION 32.6 LOCAT	ION		See Pl	ate 2		
SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
43			Medium dense to very dense gray micaceous silty medium to fine SAND						
50-	31	SS	(Residual 2 Soil)	-19.0					
55—	50/5"	SS	Very dense gray decomposed rock friable to silty coarse to fine SAND						
-	50/1"	SS							
60-		NQ							
65	80/9"	SS	(Decomposed Rock) END OF BORING	-32.5					
70-			Notes: 1. Boring advanced from 0 to 8 feet using soft dig techniques (combination of hand auger, post-hole digger, hydroexcavation, and vacuum). Samples were recovered using a hand auger at various depths. Relative density qualitatively judged based on resistance to hand probe and tools.						
75-			 Ground surface elevation at the test boring was provided by URS survey in NAVD 88 datum. Drilling resistance (i.e. rig chatter) noted at approximately 54 feet, which may be indicative of less weathered decomposed rock. 						
80-			4. The borehole was backfilled with cement/bentonite grout at completion.5. Values under "POCKET PENETROMETER" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soil.						
85— - -			Continued on Sheet 3 of 3						
Completic Project N	n Danth:			epth:	See	ft ^-	tor		_ hrs.
Project N			0000621 water L		otes				
Project N									
	Orilling Method: Hollow Stem Augers- Auto Hammer ft., After hrs.								

			LOG of BORING No. B-1				Sheet 3	of 3
DATE	10/	10/1	4 SURFACE ELEVATION 32.6 LOCA	ATION _		See Pla	te 2	
S DEPTH, FT.	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIMIT, % PLASTIC LIMIT, %	OTHER TESTS
90 —	on Denth		Notes continued: 6. Temporary two-inch diameter PVC ground water observation well was installed to a depth of approximately 65 ft below the existing ground surface with the bottom 10 ft screened. Date GW Depth (ft) GW Elev (ft) 10/21/2014 14.0 18.6 +/- 10/23/2014 10.0 22.6 +/-	r Deoth:	See	ft Afte	er_	hrs.
Project No		2	0000621		Notes		er	
Project Na			_				er	
Drilling Me	ethod:		Hollow Stem Augers- Auto Hammer			ft Afte	er	hrs.

LOG of BORING No. B-2									of 2
DATE _	10	/9/14	SURFACE ELEVATION 32.1 LOCATION	ION		See Pl	ate 2		
SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
50	31	SS	Dense to very dense gray micaceous silty coarse to fine SAND			23.1			
55—	80/8"	SS	(Residual 2 Soil) Very dense gray decomposed rock friable to silty coarse to fine SAND	-21.9	-	12.5			
60-	50/5"	SS	(Decomposed Rock) END OF BORING Notes: 1. Boring advanced from 0 to 8 feet using soft dig	-26.3	-	11.7			M
65—			techniques (combination of hand auger, post-hole digger, hydroexcavation, and vacuum). Samples were recovered using a hand auger at various depths. Relative density qualitatively judged based on resistance to hand probe and tools. 2. Ground surface elevation at the test boring was provided						
70-			by URS survey in NAVD 88 datum. 3. The borehole was backfilled with cement/bentonite grout at completion. 4. Values under "POCKET PENETROMETER" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive						
75—			soil. 5. Groundwater observed at approximately 14 feet below ground surface after completion of drilling.						
80—									
Completi Project N Project N	on Depth:			Depth:	See_	ft., A	fter		hrs.
Project N			0000621		otes				
Project N	lame:		•			ft., A	fter		_ hrs.
รู้ Drilling N	Orilling Method: Hollow Stem Augers- Auto Hammer ft., After hrs.								

	Sheet 1 c								
DATE	10/	9/14	SURFACE ELEVATION 32.1 LOCATI	ON		See P	late 2		
DEPTH, FT.	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
		AU AU	Asphalt Pavement (approx. 3" to 6") and Course Aggregate Subgrade (approx. 6")	31.1	-				
_		AU	Firm to stiff brown silty CLAY (Fill)	28.1					
5—		AU	Firm to stiff brown fine sandy SILT, trace clay						
_		AU	Thin to still brown the stated StD1, trace etay						
10	10	ss	(Fine Grained Alluvial Soil)	22.1	2.0-	19.2	22	19	M
-	17	SS	Medium dense to dense gray to brown silty fine SAND		0.8-	21.6			
-	17	SS			1.0	25.1			
15—	12	SS				23.7			M
-	17	SS	(Coarse Grained Alluvial Soil)	15.1		24.5			
20-	9	SS	Medium dense to very dense gray micaceous silty coarse to fine SAND			25.4			M
25	13	SS				24.0			
30	24	SS	(Residual 1 Soil)	0.6		36.5			M
35	31	SS	Dense to very dense gray micaceous silty coarse to fine SAND	0.0					
40-	71/11"	SS				20.7			M
Completio	44	SS	Continued on Sheet 2 of 2 (Residual 2 Soil) 58.4 ft. Water D	epth:	See	24.7	ftor		hrs.
Project No	o.:		0000621		otes				_
			Proposed PECO Post Substation Hollow Stem August Auto Hammer						
Drilling Me	ernoa: _		Hollow Stem Augers- Auto Hammer	_		π., Α	iter		_ nrs

LOG of BORING No. B-3								She	eet 1	of 2
DATE	≣	10/	13/1	4 SURFACE ELEVATION 32.4 LOCATI	ON		See P	late 2		
DEPTH, FT.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0-			AU AU	Asphalt Pavement (approx. 3" to 6") Coarse Aggregate Subbase (approx. 6") Firm to stiff brown fine sandy silty CLAY with gravel	31.4					
5.			AU AU	(Fill) Firm to stiff gray fine sandy clayey SILT / fine sandy SILT, trace clay	27.9					
10-		7 9	SS SS			3.0- 3.8 3.0-				
		11	SS	(Fine Grained Alluvial Soil)	18.4	4.5 2.0- 2.5				
15	1	12	SS	Medium dense to dense gray brown silty medium to fine SAND with varying amounts of gravel						
		34	SS	(Coarse Grained Alluvial Soil)	14.4					
20-	- - -	3	SS	Medium dense gray micaceous silty medium to fine SAND / medium to fine sandy SILT		1.0- 1.3				
25	-	7	SS							
30-	-	8	SS							
35	- - -	15	SS							
40	-	10	SS	(Residual 1 Soil)	-9.1					
ON.GPJ		20	CC	Dense to very dense gray micaceous silty medium to fine SAND / medium to fine sandy SILT						
JBSTATI		38	SS	Continued on Sheet 2 of 2 (Residual 2 Soil)						
SAND / medium to fine sandy SILT Continued on Sheet 2 of 2 (Residual 2 Soil) Completion Depth:										
Project No.: Notes it										
Drilling Method: Hollow Stem Augers- Auto Hammer										_ hrs.

LOG of BORING No. B-3									of 2
DATE _	10/	/13/1	4 SURFACE ELEVATION 32.4 LOCATI	ON		See Pl	ate 2		
SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
50	35	SS	Dense to very dense gray micaceous silty medium to fine SAND / medium to fine sandy SILT						
55	46	SS	(Residual 2 Soil) END OF BORING Notes: 1. Boring offset 15 feet west, due to fence and curb.	-27.6					
65—			 Boring advanced from 0 to 8 feet using soft dig techniques (combination of hand auger, post-hole digger, hydroexcavation, and vacuum). Samples were recovered using a hand auger at various depths. Relative density qualitatively judged based on resistance to hand probe and tools. Ground surface elevation at the test boring was provided by URS survey in NAVD 88 datum. The borehole was backfilled with cement/bentonite grout 						
75—			at completion. 5. Values under "POCKET PENETROMETER" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soil. 6. Temporary two-inch diameter PVC ground water observation well was installed to a depth of approximately						
80-			65 ft below the existing ground surface with the bottom 10 ft screened. Date GW Depth (ft) GW Elev (ft) 10/21/2014 13.0 19.4 +/- 10/23/2014 10.0 22.4 +/-						
Completing Months of the Completing Months of	on Depth:			pepth:	See otes				
Project N	o.: ame:		n introduction		0105				
Drilling M	Drilling Method: Hollow Stem Augers- Auto Hammer ft., After hrs.								

			She	eet 1	of 2				
DATE .	10/	14/1	4 SURFACE ELEVATION29.1 LOCATI	ON		See Pl	late 2		
	SAMPLES SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0-		AU		28.6					
-		AU AU	Firm to stiff gray and brown silty CLAY (Fill)	26.1					
5—		AU	Firm to stiff gray fine sandy silty CLAY / clayey SILT						
-	1.4		(Fire Coning Alleria Cail)		2.5				
10-	14	SS	(Fine Grained Alluvial Soil)	19.6	2.5-2.8				
-	11	SS	Medium dense to very dense brown silty medium to fine						
_	36	SS	SAND						
-				15.1					
15-	24	SS	Medium dense to dense silty coarse to fine SAND and						
-	10	SS	coarse to fine GRAVEL (Coarse Grained Alluvial Soil)	11.1					
20-	14	SS	Medium dense to dense brown and gray slightly micaceous	11.1					
_			silty medium to fine SAND						
_	50/6"	CC	(Residual 1 Soil)	6.1		22.0			
25—	50/6"	SS	Very dense brown and gray decomposed rock friable to silty medium to fine SAND (Decomposed Rock)	3.6		23.8			M
-									
30-	NQ 100	NQ	Hard slightly weathered to fresh gray GRANITIC GNEISS, fractures inclined approximately 10 to 20 degrees and 60 to 80 degrees from the horizontal, fracture spacing typically ranges from 1 to 18 inches.						RQD 78 U
_	<u>NQ</u>	NQ							RQD
-	82	110							72
35-			(Bedrock)	-6.4					
-			END OF BORING						
-									
40-									
-	-								
TION.GF	1		Continued on Shoot 2 of 2						
Complete Project	tion Depth:		Continued on Sheet 2 of 2 35.5 ft. Water D	epth:	See	ft A	fter		_ hrs.
Project			0000621 Water 5		otes				_ hrs.
Project	Name:		Proposed PECO Post Substation						_ hrs.
	Method: _		Hollow Stem Augers- Auto Hammer			ft., A	fter		_ hrs.

LOG of BORING No. B-4								She	eet 2	of 2
DATE	<u> </u>	10/	14/1	4 SURFACE ELEVATION29.1 LOCATI	ION		See Pl	late 2		
45.	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
50· 55· 60· 70· 75·				Notes: 1. Boring advanced from 0 to 8 feet using soft dig techniques (combination of hand auger, post-hole digger, hydroexcavation, and vacuum). Samples were recovered using a hand auger at various depths. Relative density qualitatively judged based on resistance to hand probe and tools. 2. Ground surface elevation at the test boring was provided by URS survey in NAVD 88 datum. 3. Drilling resistance (i.e. rig chatter) noted at approximately 24.5 to 25.5 feet, which may be indicative of gravel and/or cobbles. 4. The borehole was backfilled with cement/bentonite grout at completion. 5. Values under "POCKET PENETROMETER" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soil. 6. 24 hour ground water level reading taken inside augers before water was introduced for coring on the second day of drilling. Date GW Depth (ft) GW Elev (ft) 10/31/2014 13.0 16.1 +/-						
Comp		n Depth:		35.5 ft. Water D 0000621	epth:					_ hrs.
Project		o.: nme:			_1\	lotes	,			
		ethod: _		Hollow Stem Augers- Auto Hammer						

LOG of BORING No. B-5								eet 1	of 2
DATE _	10/	13/1	4 SURFACE ELEVATION 33.0 LOCATI	ON		See Pl	late 2		
DEPTH, FT.	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
		AU AU	Asphalt Pavement (approx. 3" to 6")	32.5					
- - -		AU	Brown silty coarse to fine SAND and coarse to fine GRAVEL, with cobble to boulder sized debris (concrete)						
5—		AU	(Fill)	27.0					
		AU	Firm to stiff brown and gray silty CLAY, trace fine sand						
10	7	SS	Firm to sum brown and gray stity CLAT, trace thie said		0.8				
10-	P	P				19.9	28	20	MT
	21	SS	(Fine Grained Alluvial Soil)	19.0					
15—	18	SS	Dense brown silty fine SAND	19.0					18.9
	23	SS							
20	30	SS	- becoming very dense clayey coarse to fine SAND, trace fine gravel						
20-			(Coarse Grained Alluvial Soil)	11.5					
25	11	SS	Medium dense to dense gray micaceous silty fine SAND / fine sandy SILT						
30	28	SS							
35	26	SS	(Residual 1 Soil)	-3.5					
40	40	SS	Dense to very dense gray micaceous silty fine SAND / fine sandy SILT						
Comple Project Project	31	SS	Continued on Sheet 2 of 2 (Residual 2 Soil)						
Comple	tion Depth:			epth:	See	ft., A	fter		_ hrs.
Project		2	0000621	-	otes				
Project	Name:		_			ft., A	fter		_ hrs.
្ត្រី Drilling I	Method: _		Hollow Stem Augers- Auto Hammer			ft., A	fter		_ hrs.

					eet 2	of 2				
	DATE _	10/	13/1	4 SURFACE ELEVATION 33.0 LOCATI	ON		See P	late 2		
	SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
	50	53	SS	Medium dense to very dense gray micaceous silty fine SAND / fine sandy SILT (Residual 2 Soil) Very dense gray decomposed rock friable to silty coarse to fine SAND, with relict rock structure	-13.5	_				
	55—	70	SS							
	60-	50/3"	SS	(Decomposed Rock) END OF BORING Notes: 1. Boring offset 15 feet north, due to overhead utilities.	-25.3	_				
	65—			 2. Boring advanced from 0 to 8 feet using soft dig techniques (combination of hand auger, post-hole digger, hydroexcavation, and vacuum). Samples were recovered using a hand auger at various depths. Relative density qualitatively judged based on resistance to hand probe and tools. 3. Ground surface elevation at the test boring was provided 						
	70-			by URS survey in NAVD 88 datum. 4. Drilling resistance (i.e. rig chatter) noted at approximately 56 feet, which may be indicative of gravel and/or cobbles. 5. Values listed under "OTHER TESTS" are headspace readings in parts per million obtained with a PID.						
	75— - - 80—			 6. The borehole was backfilled with cement/bentonite grout at completion. 7. Values under "POCKET PENETROMETER" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soil. 						
	85—			8. Groundwater observed at approximately 16 feet below ground surface after completion of drilling.						
ST SUBSTATION.GPJ	Complet	tion Depth:			epth:		ft., A	fter		_ hrs.
LOGR PC	Project N			0000621 Proposed PECO Post Substation	_N	<u>lotes</u>				
/15 BORL	Project N									
/2/	ווווחט N מווווזט ן	vietnod: _		Hollow Stem Augers- Auto Hammer			π., Α	πer		_ nrs.

15- 16 SS (Fine Grained Alluvial Soil) 16.3 1.5 3.8 3.8				LOG of BORING No. B-6				Sh	eet 1	of 2
DESCRIPTION Section DESCRIPTION DESC	DATE _	10/	13/1	4 SURFACE ELEVATION 32.3 LOCATI	ON		See P	late 2		
A		SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET ETROMET (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
Dense brown silty coarse to fine SAND and coarse to fine 28.8					31.3	-				
AU Stiff to very stiff gray and brown fine sandy CLAY	- - - 5		AU AU	Dense brown silty coarse to fine SAND and coarse to fine GRAVEL	28.8	-				
10	_ _			Stiff to very stiff gray and brown fine sandy CLAY						
15		26	SS							
25 SS	-	24	SS			1	16.6	25	17	M
SS SS Very dense brown silty coarse to fine SAND, trace fine 10.6 M		25	SS			4.0				279.0
Very dense brown silty coarse to fine SAND, trace fine gravel	15—	16	SS	(Fine Grained Alluvial Soil)	16.3	1.5				3.8
Coarse Grained Alluvial Soil) 10.8 Medium dense to dense gray micaceous silty medium to fine SAND 24.3 Magnitude M	_ 	58	SS							
Coarse Grained Alluvial Soil) 10.8	20	31	SS	gravel			10.6			M
25	-			(Coarse Grained Alluvial Soil)	10.8					
24 SS	25	7	SS							
26 SS	30 -	15	SS				24.3			M
Continued on Sheet 2 of 2 Completion Depth:	35	24	SS							
Completion Depth: 40.0 ft. Water Depth: See ft., After hrs. Project No.: 20000621 Notes ft., After hrs. Project Name: Proposed PECO Post Substation ft., After hrs.	40	26	SS	(Residual 1 Soil)	-7.7	-				
Completion Depth: 40.0 ft. Water Depth: See ft., After hrs. Project No.: 20000621 Notes ft., After hrs. Project Name: Proposed PECO Post Substation ft., After hrs.				END OF BORING						
Project No.: 20000621 Notes ft., After hrs. Project Name: Proposed PECO Post Substation ft., After hrs.	_			Continued on Sheet 2 of 2						
Project Name: Proposed PECO Post Substation ft., After hrs.										
1	-				_N	otes				
Drilling Method: Hollow Stem Augers- Auto Hammer ft., After hrs.	-			Hollow Stem Augers- Auto Hammer						_ hrs. _ hrs.

			Sheet 2 of							
	DATE _	10/	13/1	4 SURFACE ELEVATION 32.3 LOCATI	ON _		See P	late 2		
	DEPTH, FT.	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM EI EVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
ST SUBSTATION GPJ	45 — 50— 55— 55— 60— 75— 75— 80— 65— 65— 65— 65— 65— 65— 65— 65— 65— 65	on Depth:		Notes: 1. Boring offset 25 feet north, due to overhead utilities. 2. Boring advanced from 0 to 8 feet using soft dig techniques (combination of hand auger, post-hole digger, hydroexcavation, and vacuum). Samples were recovered using a hand auger at various depths. Relative density qualitatively judged based on resistance to hand probe and tools. 3. Ground surface elevation at the test boring was provided by URS survey in NAVD 88 datum. 4. Values listed under "OTHER TESTS" are headspace readings in parts per million obtained with a PID. 5. The borehole was backfilled with cement/bentonite grout at completion. 6. Values under "POCKET PENETROMETER" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soil. 7. Groundwater observed at approximately 14 feet below ground surface after completion of drilling.	pepth:	See	ft., A	fter		_ hrs.
3R POST	Project N	-		0000621 Water E		Notes				
ORLOG	-	lame:			_					
1/5/15 B	Drilling M	lethod: _	ft., After h							

			LOG of BORING No. B-7				She	eet 1	of 2
DATE	10	/14/1	4 SURFACE ELEVATION24.5 LOCATI	ION		See Pl	late 2		
	SAMPLES SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
0-		AU AU	Coarse Aggregate (approx. 6 inches)	24.0					
		AU	Firm to stiff gray clayey SILT with gravel (Fill)	21.5					
		AU	(FIII)	21.3					
5-	-	AU	Firm to stiff gray fine sandy silty CLAY / clayey SILT						
	-	AU							
10-	7	SS			1.5- 2.0	21.1	29	18	M
	10	SS			1.5-	19.8			
	8	SS			2.0 0.8- 1.0	18.2			
15-	- 14	SS	(Fine Grained Alluvial Soil)	8.9		17.9			
	34	SS	Very dense brown silty coarse to fine gravelly coarse to fine SAND	6.5		16.1			M
	- 2	SS	(Coarse Grained Alluvial Soil)		0.5-	38.7			M
20-	- T 		Loose to dense gray to light gray micaceous medium to fine sandy SILT / silty medium to fine SAND		0.8				
25-	25	SS				29.1			
-	50/0"	SS	(Residual 1 Soil)	-2.0					
	_		Hard slightly weathered to fresh gray GRANITIC GNEISS,						
30-	<u>NQ</u> 100	NQ							RQD 100
-	NO.	NO							DOD.
35-	- <u>NQ</u> - 58	NQ							RQD 57
-	-		(Bedrock)	-12.0					
] [1		END OF BORING						
40-	<u> </u>								
	_								
BSTATION.GPJ	-								
- ■			Continued on Sheet 2 of 2						
Comple	etion Depth:		36.5 ft. Water D	epth:S					
Complex Project	t No.: t Name:		Proposed PECO Post Substation	<u>N</u>	otes				
FIUJECI	Method:		Hollow Stem Augers- Auto Hammer	_					

DATE 10/14/14 SURFACE FLEVATION 24.5 LOCATION	See	D1 / 2									
DATE $10/14/14$ SURFACE ELEVATION 24.5 LOCATION See Plate 2											
SAMPLES SAMPLING RESISTANCE SAMPLE TYPE SA	POCKET PENETROMETER (TSF)	CONTENT, % LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS							
Notes: 1. Boring advanced from 0 to 8 feet using soft dig techniques (combination of hand auger, post-hole digger, hydroexcavation, and vacuum). Samples were recovered using a hand auger at various depths. Relative density qualitatively judged based on resistance to hand probe and tools. 2. Ground surface elevation at the test boring was provided by URS survey in NAVD 88 datum. 3. Drilling resistance (i.e. rig chatter) noted at approximately 25 to 26.5 feet, which may be indicative of gravel and/or cobbles. 4. The borchole was backfilled with cement/bentonite grout at completion. 5. Values under "POCKET PENETROMETER" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soil. 6. Groundwater observed at approximately 12 feet below ground surface after completion of drilling.											
Valor Beptil.	* .	After									
Project No.:	•	After									
Project Name: Troposcu i Eco Fost Substation Troposcu i Eco F		After									

			LOG of BORING No. B-8				She	eet 1	of 2
DATE _	10/	15/14	4 SURFACE ELEVATION28.8 LOCATI	ION		See Pl	late 2	·	
DEPTH, FT.	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
		AU	Coarse Aggregate (approx. 12 inches)	27.8					
_ _ _		AU AU	Firm to stiff gray silty CLAY with trace brick and wood fragments						
5-		AU	(Fill)	23.8	-				
- - -		AU	Firm to stiff brown gray fine sandy clayey SILT / silty CLAY						
10	12	SS			0.5				
10-	P	P	(Fine Grained Alluvial Soil)	17.2	0.8-	23.0	35	21	MC
	13	SS	Medium dense to very dense brown silty medium to fine SAND with coarse to fine gravel		1.0				3.4
15—	36	SS	SAIND WILL COMSC to Thic graves						
	29	SS							
20	17	SS	- light gray						
20			(Coarse Grained Alluvial Soil)	7.3					
25	31	SS	Medium dense to very dense gray micaceous silty medium to fine SAND						
30	16	SS	(Residual 1 Soil)	-2.7					
-	50/2"	SS	Very dense gray micaceous decomposed rock friable to silty coarse to fine SAND, relict rock structure						
35—	50/1"	SS	(Decomposed Rock)	-7.4					
_	30/1		Hard slightly weathered to fresh gray GRANITIC GNEISS, fractures inclined approximately 0 to 20 degrees from the				J		
	NQ	NQ	horizontal, fracture spacing typically ranges from 1.5 to 16						RQD
40-	80		inches. (Bedrock)	-12.2					67
			END OF BORING						
	ion Depth:		Continued on Sheet 2 of 2 41.0 ft. Water D	Depth:	See	<u> </u>	ftor		_ hrs.
Project N	•	2	0000621 water 5		otes				
Complet Project N Project N			Proposed PECO Post Substation						
Drilling N			Hollow Stem Augers- Auto Hammer						

			LOG of BORING No. B-8				She	eet 2	of 2
DATE	10/	15/1	4 SURFACE ELEVATION 28.8 LOCATI	ON		See Pl	late 2		
DEPTH, FT.	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
50— 55— 60— 65—			Notes: 1. Boring advanced from 0 to 8 feet using soft dig techniques (combination of hand auger, post-hole digger, hydroexcavation, and vacuum). Samples were recovered using a hand auger at various depths. Relative density qualitatively judged based on resistance to hand probe and tools. 2. Ground surface elevation at the center test boring was provided by URS survey in NAVD 88 datum. 3. Drilling resistance (i.e. rig chatter) noted at approximately 34 to 36 feet, which may be indicative of gravel and/or cobbles. 4. Values listed under "OTHER TESTS" are headspace readings in parts per million obtained with a PID. 5. The borehole was backfilled with cement/bentonite grout at completion. 6. Values under "POCKET PENETROMETER" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soil. 7. Groundwater observed at approximately 13 feet below ground surface after completion of drilling.						
75—									
80-									
85— Completic Project No									
Completion	on Depth:			epth:	See	ft., A	fter		_ hrs.
Project No		2	0000621	_1	<u>Notes</u>				
			Proposed PECO Post Substation						
້ອີ Drilling Me	ethod: _		Hollow Stem Augers- Auto Hammer			ft., A	fter		_ hrs.

			LOG of BORING No. B-9				She	eet 1	of 3
DATE _	10/	15/14	4 SURFACE ELEVATION 27.2 LOCATI	ION		See Pl	late 2		
DEPTH, FT.	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
		AU	Coarse Aggregate with slag (approx. 12 inches)	26.2	-				
		AU AU	Firm to stiff gray silty CLAY (Fill)	24.2					
5—		AU	Firm gray and brown fine sandy silty CLAY /clayey SILT						
		AU							
10—	9	SS	(Fine Grained Alluvial Soil)	17.2					134.0
-	10	SS	Medium dense to very dense gray brown silty fine SAND						266.0
	10	SS	Medium dense to very dense gray brown sitty fine 57.1.12						1240.0
15—	22	SS							39.0
	30	SS	- becoming brown silty coarse to fine sandy GRAVEL (Coarse Grained Alluvial Soil)	9.2	-				19.0
20	9	SS	Medium dense gray micaceous silty medium to fine SAND						
			(Residual 1 Soil)	4.2					
25	52	SS	Very dense gray micaceous silty medium to fine SAND						
30-	39	SS							
35—	62	SS	(Residual 2 Soil)	-7.3	-				
	50/5"	SS	Very dense gray micaceous silty coarse to fine SAND and coarse to fine GRAVEL						
40-									
Completi Project N Project N	81	SS	Continued on Sheet 2 of 3 (Decomposed Rock)						
Completi	on Depth:			epth:	See	ft., A	fter		_ hrs.
Project N			0000621	_N	otes	ft., A	fter		hrs.
Project N	lame:		•						
Drilling M	ietnoa: _		Hollow Stem Augers- Auto Hammer			π., A	πer		hrs.

			LOG of BORING No. B-9				Sho	eet 2	of 3
DATE _	10/	15/1	4 SURFACE ELEVATION27.2 LOCATI	ION		See Pl	ate 2	<u>. </u>	
SAMPLES	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION	STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
50-	50/1"	SS	Very dense gray decomposed rock, partially friable to silty coarse to fine SAND and coarse to fine GRAVEL, with relict rock structure						
55-	50/1"	SS							
			(Decomposed Rock)	-30.8					
60-	<u>NQ</u> 92	NQ	Hard slightly weathered GRANITIC GNEISS, fractures inclined approximately 15 to 45 degrees from the horizontal, fracture spacing typically ranges from 1 to 9 inches.						RQD 53
65-	<u>NQ</u> 100	NQ	(Bedrock)	-40.8					RQD 60
70-			END OF BORING Notes: 1. Boring offset 22 feet east, due to overhead utilities. 2. Boring advanced from 0 to 8 feet using soft dig						
75— -			techniques (combination of hand auger, post-hole digger, hydroexcavation, and vacuum). Samples were recovered using a hand auger at various depths. Relative density qualitatively judged based on resistance to hand probe and tools.						
80-			 3. Ground surface elevation at the test boring was provided by URS survey in NAVD 88 datum. 4. Drilling resistance (i.e. rig chatter) noted at approximately 36 feet and 47 to 58 feet, which may be indicative of gravel and/or cobble-sized rock fragments. 5. Values listed under "OTHER TESTS" are headspace 						
85— - - - -			readings in parts per million obtained with a PID. 6. Boring advanced by mud rotary drilling methods from 53 feet to 58 feet.						
Completic Project N Project N Project N			Continued on Sheet 3 of 3	(0 - 2		<u></u>		<u> </u>
Completion Project N	on Depth:			epth: N	See lotes				
Project N	lame:		Proposed PECO Post Substation						
Drilling M	lethod: _		Hollow Stem Augers- Auto Hammer			ft., A	fter		hrs.

			LOG of BORING No. B-	9				She	eet 3	of 3
DATE	10/	15/1	4 SURFACE ELEVATION 27.2	OCATION			See Pl	ate 2		
S DEPTH, FT.	SAMPLING RESISTANCE	SAMPLE TYPE	DESCRIPTION		STRATUM ELEVATION	POCKET PENETROMETER (TSF)	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
90 -			Notes: (continued) 7. The borehole was backfilled with cement/bentonite gr at completion. 8. Values under "POCKET PENETROMETER" are poor penetrometer resistance readings in tons per square foot, indication of unconfined compressive strength of cohesi soil. 9. Groundwater observed at approximately 13 feet below ground surface after completion of drilling. 10. Petroleum odor present from 1 foot to 18 feet below ground surface.	cket , an ve						
Completio	-			/ater Dept						
Project No		2	0000621		_N	lotes				
Project Na			Proposed PECO Post Substation Hellow Store Augusta Auto Homeron							
Drilling Me	ethod: _		Hollow Stem Augers- Auto Hammer				ft., A	fter		_ hrs.

		LOG of TEST PIT No. TP - 1	Sheet	1 of 1
DATE	1/	22/15 SURFACE ELEVATION 32.7 LOCATION See Plat	e 2	
O DEPTH, FT.	SAMPLES POCKET PENETROMETER (TSF)	DESCRIPTION	STRATUM ELEVATION	OTHER TESTS
		Asphalt Pavement (approx. 2") Medium dense brown silty coarse to fine GRAVEL with coarse to fine SAND (similar to PENNDOT No. 2A Coarse Aggregate) (Subbase) Medium dense dark brown silty coarse to fine SAND and coarse to fine GRAVEL, with cobble to boulder-sized debris	32.5 31.7	0 M 0.0
	1.8-	(Fill) Very stiff to hard grayish brown clayey SILT, trace fine sand	28.7	0.0
5-	>4.5			0.0
	_	(Fine-Grained Alluvial Soil) END OF TEST PIT	24.7	
110 –	-	Notes: 1. Values under "Pocket Penetrometer" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils. 2. Values under "OTHER TESTS" are Photoionization Detector (PID) readings from the sample head space in parts per million (ppm). 3. Ground surface elevation at the test pit location was provided by URS survey in NAVD 88 datum.		
⊢ ■		th:8.0 ft Water Depth, ft.:>8.0 PECO Post Substation Project No.:20000621.00	0004_	

			LOG of TEST PIT No. TP - 2	Sheet	1 of 1	
DATI	E _	1/2	3/15 SURFACE ELEVATION 32.5 LOCATION See Plat	e 2		
DEPTH, FT.	SAMPLES	POCKET PENETROMETER (TSF)	DESCRIPTION	STRATUM ELEVATION	OTHER TESTS	
0			Asphalt Pavement (approx. 3")	32.3		
	-		Medium dense brown silty coarse to fine GRAVEL with coarse to fine SAND (similar to PENNDOT No. 2A Coarse Aggregate) (Subbase)	31.5		
	_		Soft to firm brown clayey SILT, with coarse to fine gravel and coarse to fine sand, trace cobbles			
	_		HISTORIC FOUNDATIONS AND STRUCTURES ENCOUNTERED DURING TEST PIT EXCAVATION. SEE PLATE 2 AND PHOTO LOG FOR DIMENSIONS		X	
5	_	0.5- 1.0	AND ADDITIONAL INFORMATION.		0.0	
	-		(Fill)	26.0		
			END OF TEST PIT	26.0		
TSTPILL PECO POST SUBSTATION TEST PITS. DAM GPJ. Com.			Notes: 1. Values under ""Pocket Penetrometer"" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils. 2. Values under "OTHER TESTS" are Photoionization Detector (PID) readings from the sample head space in parts per million (ppm). 3. Discrete environmental samples collected from 3.0 to 3.5 ft depth interval and tested for VOCs, SVOCs, PP Metal, and PCBs. 4. Ground surface elevation at the test pit location was provided by URS survey in NAVD 88 datum.			
Completion Depth: 6.5 ft. Water Depth, ft.: >6.5 Project Name: PECO Post Substation Project No.: 20000621.00004						

ı				LOG of TEST PIT No. TP - 3	Sheet	1 of 1
L	DATE	<u> </u>		22/15 SURFACE ELEVATION 31.8 LOCATION See Plat	e 2	
	ь DEРТН, FT.	SAMPLES	POCKET PENETROMETER (TSF)	DESCRIPTION	STRATUM ELEVATION	OTHER TESTS
ı	0			Asphalt Pavement (approx. 3")	31.5	
				Medium dense brown silty coarse to fine GRAVEL with coarse to fine SAND (similar to PENNDOT No. 2A Coarse Aggregate) (Subbase)	31.1	
			1.0- 1.3	Soft to firm gray brown clayey SILT/ silty CLAY, some coarse to fine sand and coarse to fine gravel		0.0 M W
				HISTORIC FOUNDATIONS AND STRUCTURES ENCOUNTERED DURING TEST PIT EXCAVATION. SEE PLATE 2 AND PHOTO LOG FOR DIMENSIONS AND ADDITIONAL INFORMATION.		
	5			(Fill)	25.8	
ı				END OF TEST PIT		
PECO POST SUBSTATION TEST PITS. DJM.GPJ	10			Notes: 1. Values under ""Pocket Penetrometer"" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils. 2. Values under "OTHER TESTS" are Photoionization Detector (PID) readings from the sample head space in parts per million (ppm). 3. Ground surface elevation at the test pit location was provided by URS survey in NAVD 88 datum.		
	Com	plet	ion Depth	h:6.0 ft Water Depth, ft.:>6.0		
⊏∎				PECO Post Substation Project No.: 20000621.00	0004_	

		LOG of TEST PIT No. TP - 4	Sheet	1 of 1			
DATE _	1/2	3/15 SURFACE ELEVATION 31.5 LOCATION See Plat	te 2				
DEPTH, FT.	POCKET PENETROMETER (TSF)	DESCRIPTION	STRATUM ELEVATION	OTHER TESTS			
		Asphalt Pavement (approx. 4")	31.2				
_		Medium dense brown silty coarse to fine GRAVEL with coarse to fine SAND (similar to PENNDOT No. 2A Coarse Aggregate) (Subbase)	29.7				
		Medium dense to dense dark brown coarse SAND and coarse to fine GRAVEL, trace cobbles		0.0			
		(Fill)	28.0				
-	1.0- 2.0	Firm to stiff grayish brown silty CLAY, with coarse to fine sand		0.0 M			
5—		HISTORIC FOUNDATIONS AND STRUCTURES ENCOUNTERED DURING TEST PIT EXCAVATION. SEE PLATE 2 AND PHOTO LOG FOR DIMENSIONS AND ADDITIONAL INFORMATION.		X			
	2.2	(Fill- Depth Varies)	24.5				
_	3.3- 4.3	Very stiff to hard grayish brown fine sandy SILT, trace clay (Fine-Grained Alluvial Soil)	23.5	0.0			
		END OF TEST PIT					
10— Complete Project N		Notes: 1. Values under ""Pocket Penetrometer"" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils. 2. Values under "OTHER TESTS" are Photoionization Detector (PID) readings from the sample head space in parts per million (ppm). 3. Discrete environmental samples collected from 4.0 to 4.5 ft. depth interval and tested for VOCs, SVOCs, PP Metal, and PCBs. 4. The thickness of Fill varies across the test pit from approximately 3.5 to 7.0 ft. 5. Ground surface elevation at the test pit location was provided by URS survey in NAVD 88 datum.					
Completion Depth: 8.0 ft. Water Depth, ft.: >8.0 Project Name: PECO Post Substation Project No.: 20000621.00004							

DATE 1/20/15 SURFACE ELEVATION 33.0 LOCATION See	STRATUM ELEVATION	STS
MPLES MPLES (APLES TSF) DESCRIPTION	STRATUM ELEVATION	STS
SAN		OTHER TESTS
Asphalt Pavement (approx. 3")	32.7	
Medium dense brown silty coarse to fine GRAVEL with coarse to fine SAND (simila to PENNDOT No. 2A Coarse Aggregate) (Subbase)	21.0	0.0 M
Dense brown COBBLES and fine GRAVEL, with coarse sand (Balla		0.0
2.3- Very stiff to hard dark brown clayey SILT, some coarse to fine gravel and coarse to fine gr	ne	0.0
3.8- 4.5		X 0.0
5— 3.8- 4.5	11)	0.0
4.5 Hard brown fine sandy silty CLAY	ll) 27.6	0.0
	il) 25.0	0.0
END OF TEST PIT	23.0	
Notes: 1. Values under ""Pocket Penetrometer"" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils. 2. Values under "OTHER TESTS" are Photoionization Detector (PID) readings from the sample head space in parts per million (ppm). 3. Discrete environmental samples collected from 3.0 to 3.5 ft. depth interval and tested for VOCs, SVOCs, PP Metal, and PCBs. 4. Ground surface elevation at the test pit location was provided by URS survey in NAVD 88 datum.		
Completion Depth: 8.0 ft Water Depth, ft.: >8.0 ft Project Name: PECO Post Substation Project No.: 2000062		

I				LOG of TEST PIT No. TP - 6	Sheet	1 of 1
	DATE	<u> </u>	1/2	21/15 SURFACE ELEVATION 32.3 LOCATION See Plate	e 2	
	ОЕРТН, FT.	SAMPLES	POCKET PENETROMETER (TSF)	DESCRIPTION	STRATUM ELEVATION	OTHER TESTS
ı	0-			Asphalt Pavement (approx. 4")	32.0	
		-		Medium dense brown silty coarse to fine GRAVEL with coarse to fine SAND (similar to PENNDOT No. 2A Coarse Aggregate) (Subbase)	31.8	0.0
		_		Dense brown COBBLES and fine GRAVEL, with coarse sand (Ballast)/	30.5	
			>4.5	Stiff to hard dark brown clayey SILT, some coarse to fine gravel and coarse to fine sand, trace cobble-sized concrete debris and wood debris		3.0 X
			>4.5			10.0
	5-		1.5- 2.3	(Fill)	27.3	300
				Stiff to very stiff brown fine sandy silty CLAY		
						X
		-	1.8- 2.5	(Fine-Grained Alluvial Soil)	24.9	300
				END OF TEST PIT		
TSTPITL PECO POST SUBSTATION TEST PITS- DJM.GPJ	10-			Notes: 1. Values under ""Pocket Penetrometer"" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils. 2. Values under "OTHER TESTS" are Photoionization Detector (PID) readings from the sample head space in parts per million (ppm). 3. Discrete environmental samples collected from 2.5 to 3.0 ft. and 6.0 to 6.4 ft. depth intervals and tested for VOCs, SVOCs, PP Metal, and PCBs. 4. Ground surface elevation at the test pit location was provided by URS survey in NAVD 88 datum.		
TSTPITL PECO				n:	0004	
4/8/15	Proje	Ct N	ame: _	PECO Post Substation Project No.: 20000621.00	<u> </u>	

		LOG of TEST PIT No. TP - 7	Sheet '	1 of 1
DATE		1/15 SURFACE ELEVATION 32.9 LOCATION See Plate	e 2	
SAMPLES POCKET	PENETROMETER (TSF)	DESCRIPTION	STRATUM ELEVATION	OTHER TESTS
		Asphalt Pavement (approx. 5")	32.5	
	h	Medium dense brown silty coarse to fine GRAVEL with coarse to fine SAND (similar	32.2	
-		to PENNDOT No. 2A Coarse Aggregate) (Subbase)	31.5	
	þ	Dense brown COBBLES and fine GRAVEL, with coarse sand	31.3	
-		(Ballast)		
_		Stiff gray fine sandy SILT, little clay, trace coarse to fine gravel		0.0
5—		- becoming dense brown coarse to fine SAND, little coarse to fine gravel, trace silt and cobble-sized brick debris		0.0
		(Fill)	27.4	0.0
-		Firm to stiff brown fine sandy silty CLAY		
■ 1888	2.0			0.0
-		(Fine-Grained Alluvial Soil)	23.4	
10-		END OF TEST PIT		
POST SUBSTATION TEST PITS- DJM/GPJ		Notes: 1. Values under ""Pocket Penetrometer"" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils. 2. Values under "OTHER TESTS" are Photoionization Detector (PID) readings from the sample head space in parts per million (ppm). 3. Ground surface elevation at the test pit location was provided by URS survey in NAVD 88 datum.		
DECO	Dr. :"	. 059		
⊏∎		:9.5 ft	0004	

				LOG of TEST PIT No. TP - 8	Sheet	1 of 1
L	DATE	_		21/15 SURFACE ELEVATION 32.8 LOCATION See Plat	e 2	
Ī	DEPTH, FT.	SAMPLES	POCKET PENETROMETER (TSF)	DESCRIPTION	STRATUM ELEVATION	OTHER TESTS
	0-			Asphalt Pavement (approx. 4")	32.5	
		-		Medium dense brown silty coarse to fine GRAVEL with coarse to fine SAND (similar to PENNDOT No. 2A Coarse Aggregate) (Subbase)	32.0	0.0
				Dense brown COBBLES and fine GRAVEL, with coarse sand (Ballast)	31.1	
		_	>4.5	Hard gray clayey SILT / silty CLAY, little fine gravel, cobbles, brick fragments		65 M
		_	>4.5			3.3 M
					28.3	
	5-			Dense dark gray coarse to fine SAND and coarse to fine GRAVEL, trace silt		0.0
		_		- becoming clayey		3.1
				(Fill)	25.0	
		_	1.0- 1.8	Firm to stiff brown clayey SILT		4.2
				(Fine-Grained Alluvial Soil)	23.3	
	10-	_		Notes: 1. Values under ""Pocket Penetrometer"" are pocket penetrometer resistance readings		
EST PITS- DJM.GPJ		- -		in tons per square foot, an indication of unconfined compressive strength of cohesive soils. 2. Values under "OTHER TESTS" are Photoionization Detector (PID) readings from the sample head space in parts per million (ppm). 3. Ground surface elevation at the test pit location was provided by URS survey in NAVD 88 datum.		
CO POST SUBSTATION TEST PITS- DJM.GP.		_				
PITL PEC	Com	pleti	on Depth	n: <u>9.5 ft.</u> Water Depth, ft.: <u>9.3</u>		
				PECO Post Substation Project No.: 20000621.00	0004_	

				LOG of TEST PIT No. TP - 9	Sheet	1 of 1
	DATE	≣ _	1/2	6/15 SURFACE ELEVATION 24.4 LOCATION See Plat	e 2	
	О БЕРТН, FT.	SAMPLES	POCKET PENETROMETER (TSF)	DESCRIPTION	STRATUM ELEVATION	OTHER TESTS
	V	_		Medium dense to dense gray coarse to fine SAND and coarse to fine GRAVEL, trace silt		0.0
				(Fill)	22.5	
		-	>4.5	Very stiff to hard brown sandy clayey SILT		0.0 X 0.0 T C
	5.	_	3.8- 4.5			0.0
	3	_	1.5- 3.0			0.0
				(Fine-Grained Alluvial Soil)	17.4	
		1		END OF TEST PIT	17.4	
5 TSTPITL PECO POST SUBSTATION TEST PITS-DJM.GPJ	10-			Notes: 1. Values under ""Pocket Penetrometer"" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils. 2. Values under "OTHER TESTS" are Photoionization Detector (PID) readings from the sample head space in parts per million (ppm). 3. Discrete environmental samples collected from 2.5 to 3.0 ft. depth interval and tested for VOCs, SVOCs, PP Metal, and PCBs. 4. Ground surface elevation at the test pit location was provided by URS survey in NAVD 88 datum.		
TPITL PECO				n:		
4/8/15 TS	Proje	ect N	ame: _	PECO Post Substation Project No.: 20000621.00	0004_	

				LOG of TEST PIT No. TP -10	Sheet	1 of 1
	DATE	= _		26/15 SURFACE ELEVATION 27.8 LOCATION See Plat	te 2	
	O DEPTH, FT.	SAMPLES	POCKET PENETROMETER (TSF)	DESCRIPTION	STRATUM ELEVATION	OTHER TESTS
	O	_		Medium dense brown coarse to fine sandy coarse to fine GRAVEL (Fill)	26.5	0.0
			>4.5	Hard brown fine sandy clayey SILT		0.0
			>4.5			0.0 C X
	5		>4.5			0.0
				(Fine-Grained Alluvial Soil)	21.8	
POST SUBSTATION TEST PITS- DJM.GPJ	10			Notes: 1. Values under ""Pocket Penetrometer"" are pocket penetrometer resistance readings in tons per square foot, an indication of unconfined compressive strength of cohesive soils. 2. Values under "OTHER TESTS" are Photoionization Detector (PID) readings from the sample head space in parts per million (ppm). 3. Discrete environmental samples collected from 3.5 to 4.0 ft. depth interval and tested for VOCs, SVOCs, PP Metal, and PCBs. 4. Ground surface elevation at the test pit location was provided by URS survey in NAVD 88 datum.		
STPITL PECO I				n:		
4/8/15 TS	Proje	ect N	Name: _	PECO Post Substation Project No.: 20000621.00	<u> </u>	

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: Stantec **LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-001 PROJECT NUMBER: **213402567** STARTED 3/22/16 *NORTHING (ft): **182451.82** *EASTING (ft): 2620086.75 COMPLETED: 3/22/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 2.0 BOREHOLE DEPTH (ft): 2 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer

Į	SAMPLING	EQU	IPME	NT: Backhoe Bucket	*COORDINATE SYSTEM AND DA					IAVD 88	
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
•	1 -		CL	Soft CLAY, grayish-blue, high plasticity, odor pre	sent		AOI5-BH-16-00 (0-2')			1596	_
	2 -			End of boring at 2.0'							<u></u>
	3 -										_
7	4 -										_
E 010509.GDT 5/10/1	5-										5-
ENVIRO TEMPLATE	6 -										_
INGS.GPJ STANTE(7 -										_
EN AOI5 SOIL BOR	8 -										_
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17	9 -										_

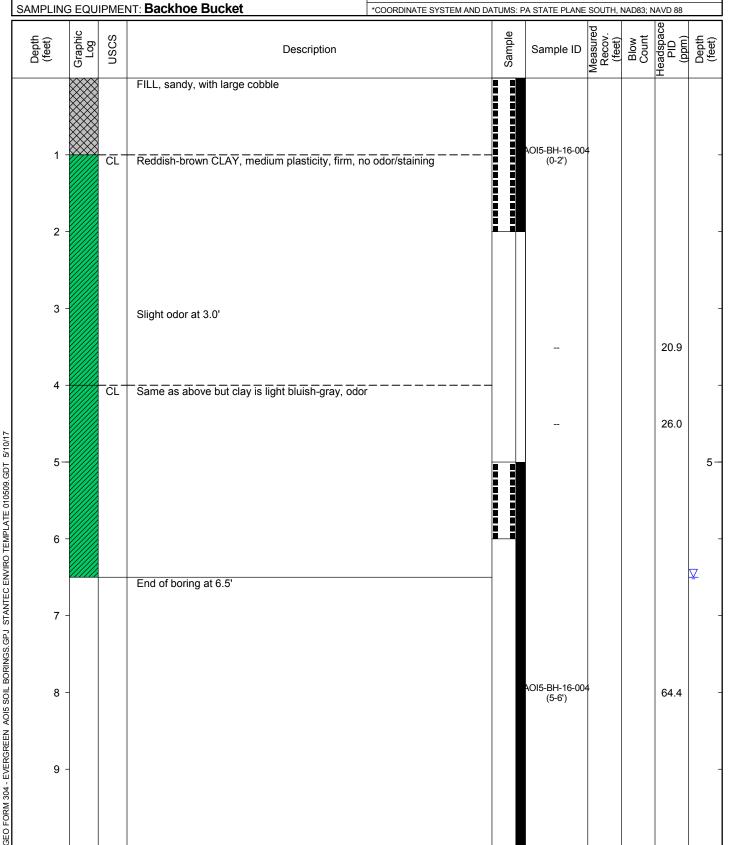
PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: Stantec **LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-002 PROJECT NUMBER: **213402567** *NORTHING (ft): 182582.11 *EASTING (ft): **2620283.28** STARTED 3/22/16 COMPLETED: 3/22/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 4.0 BOREHOLE DEPTH (ft): 4 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer

SAN	SAMPLING EQUIPMENT: Backhoe Bucket *COORDINATE SYSTEM				*COORDINATE SYSTEM AND DA	I AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88						
Japth	(feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)	
	1 -			Large COBBLE mixed in with bluish-gray CLAY a GRAVEL, odor present			AOI5-BH-16-002 (0-2')			56.7	-	
	3 -			Same as above but subangular gravel instead of	large cobble					240	-	
	4 -			End of boring at 4.0'			AOI5-BH-16-002 (3-4')	!		797	<u> </u>	
DT 5/10/17	5-			Life of borning at 4.0							5-	
O TEMPLATE 010509.G	6 -										-	
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS,GPJ STANTEC ENVIRO TEMPLATE 010509,GDT 5/10/17	7 -										-	
AOI5 SOIL BORINGS.	8 -										-	
M 304 - EVERGREEN	9 -										-	
GEO FOR												

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: Stantec **LOCATION: AOI 5 Characterization** AOI5-BH-16-003 PAGE 1 OF 1 PROJECT NUMBER: **213402567** *EASTING (ft): 2620448.47 *NORTHING (ft): 182688.45 DRILLING: STARTED 3/22/16 COMPLETED: 3/22/16 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 5.0 BOREHOLE DEPTH (ft): 5 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer

	SAMPLING			NT: Backhoe Bucket	*COORDINATE SYSTEM AND DATU			SOUTH, I			
	Depth (feet)	Graphic Log	nscs	Description		Sample		Measured Recov. (feet)	Blow	Headspace PID (mdd)	Depth (feet)
	1 -		SP	Yellow-brown SAND with medium subangular gra	avel		AOI5-BH-16-003 (0-2')			0.0	_
	2 -		CL	Bluish-gray CLAY with olive mottling, medium pla	sticity					0.0	-
	3 -			Odor present at 3.0'			AOI5-BH-16-003 (3-4')	3		159	-
10/17	4 -				Ī					57.7	-
ATE 010509.GDT 5/	5-			End of boring at 5.0'							<u>∨</u> 5−
EC ENVIRO TEMPLA	6 -										_
RINGS.GPJ STANTE	7 -										-
EN AOI5 SOIL BOR	8 -										-
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17	9 -										-
GEC											

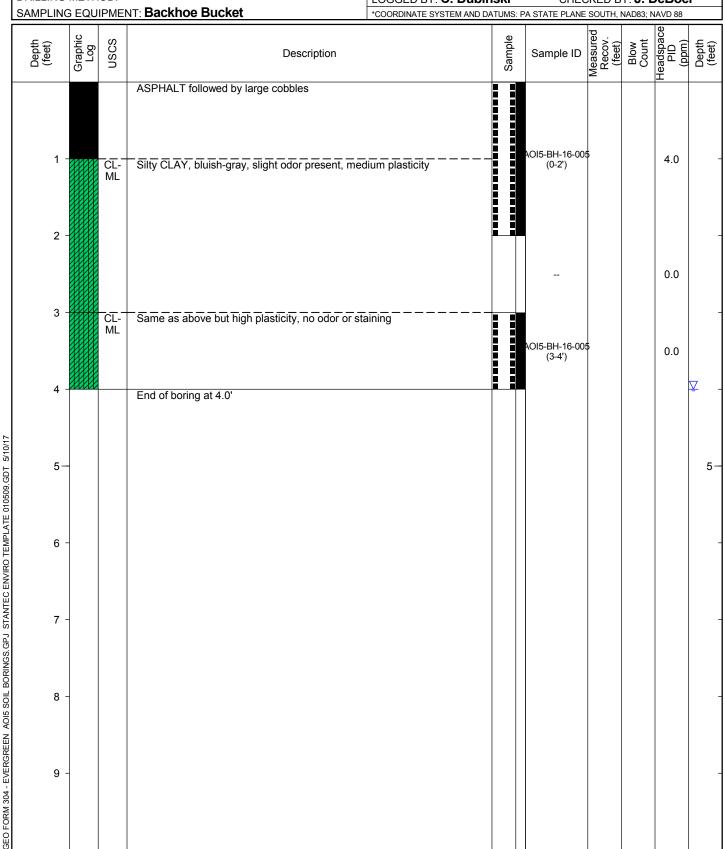
PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 2 AOI5-BH-16-004 PROJECT NUMBER: **213402567** *NORTHING (ft): 182311.19 *EASTING (ft): 2620462.27 STARTED 3/22/16 DRILLING: COMPLETED: 3/22/16 *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 6.5 BOREHOLE DEPTH (ft): 6.5 DRILLING COMPANY: Sweeney STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer



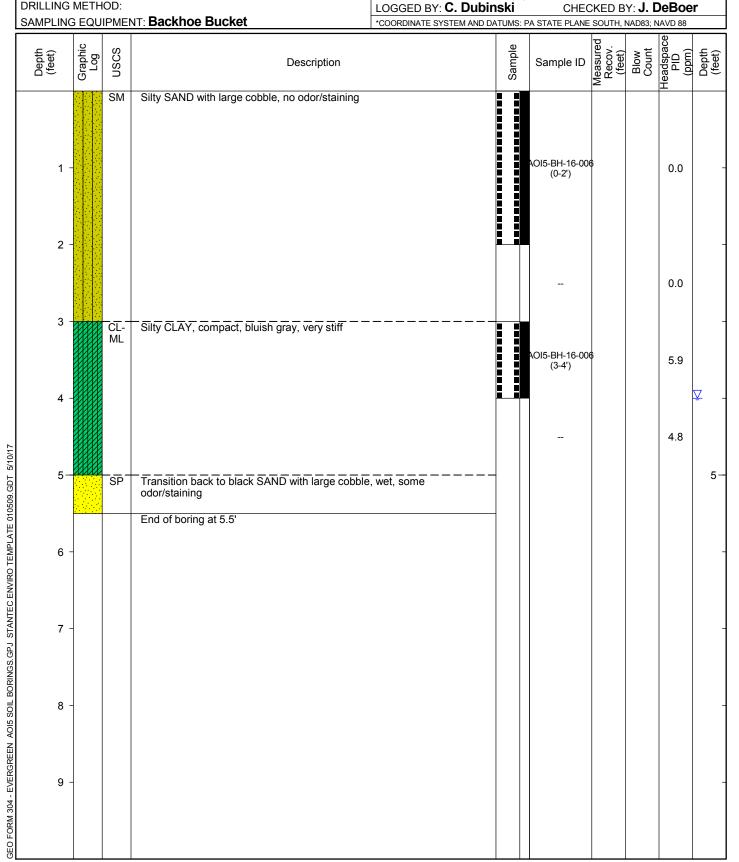
PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: Stantec LOCATION: AOI 5 Characterization AOI5-BH-16-004 PAGE 2 OF 2 PROJECT NUMBER: **213402567** *NORTHING (ft): 182311.19 *EASTING (ft): 2620462.27 STARTED 3/22/16 COMPLETED: 3/22/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 6.5 BOREHOLE DEPTH (ft): **6.5** DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer

L	SAMPLING	EQU	IPMEI	NT: Backhoe Bucket	*COORDINATE SYSTEM AND DAT		PA STATE PLANE	SOUTH,	NAD83; N		
	Depth (feet)	Graphic Log	SOSO	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
	11 -										_
	12 -										-
	13 -										-
	14 -										-
. U10509.6D1 5/10/1/	15—										15—
C EINVIRO LEIMPLATE	16 -										-
ORINGS.GPJ STAINIE	17 -										-
ZEEN AUG SUIL D	18 -										-
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17	19 -										-

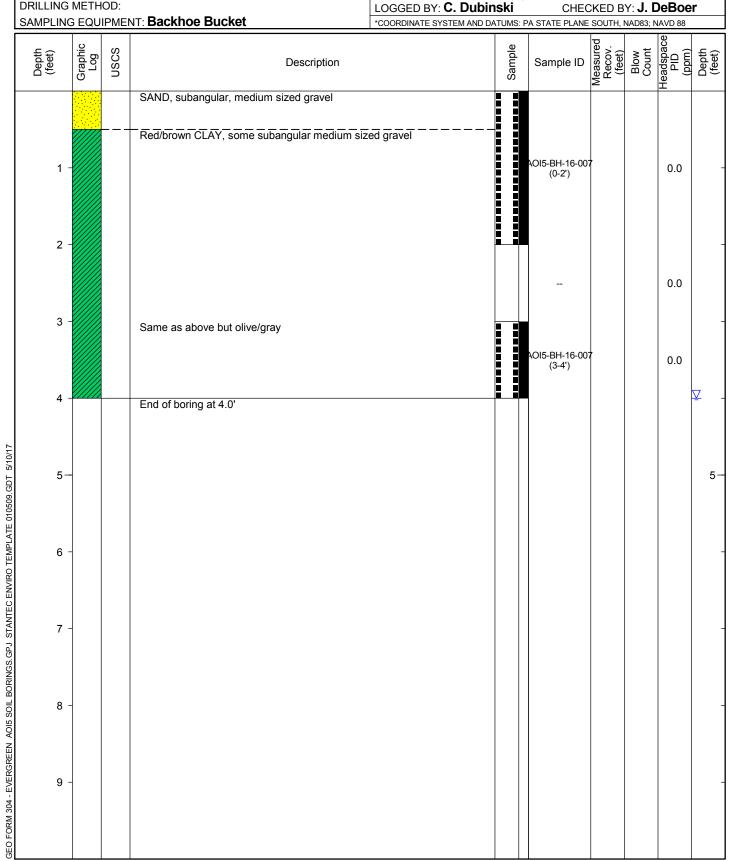
PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-005 PROJECT NUMBER: **213402567** *EASTING (ft): 2620623.03 *NORTHING (ft): 182421.26 STARTED 3/22/16 DRILLING: COMPLETED: 3/22/16 *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 4.0 BOREHOLE DEPTH (ft): 4 DRILLING COMPANY: Sweeney STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer



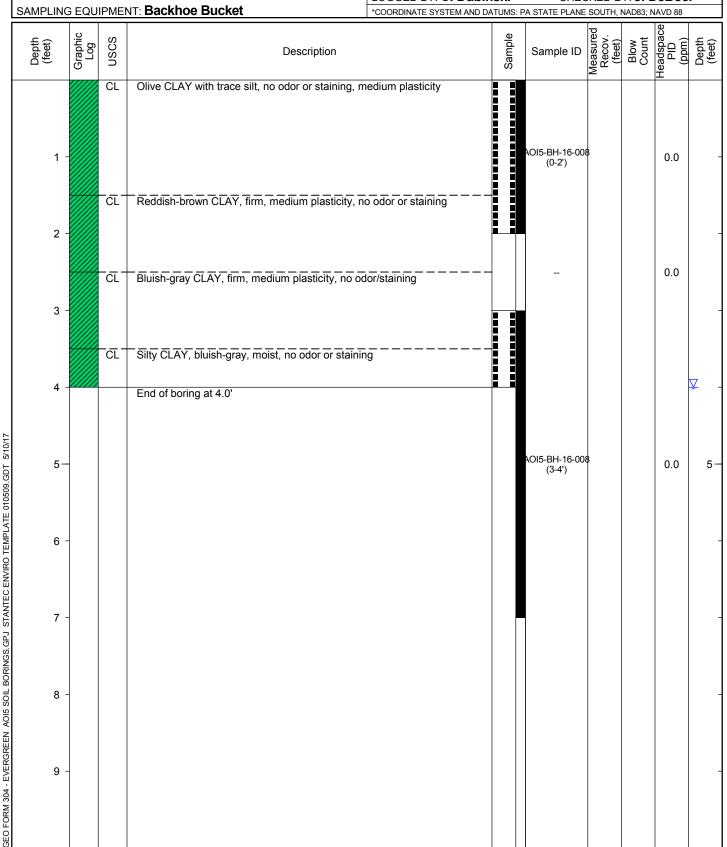
PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-006 PROJECT NUMBER: **213402567** *EASTING (ft): 2620816.53 *NORTHING (ft): 182128.88 STARTED 3/22/16 DRILLING: COMPLETED: 3/22/16 *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 4.0 BOREHOLE DEPTH (ft): 5.5 DRILLING COMPANY: Sweeney STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA **DRILLING METHOD:**



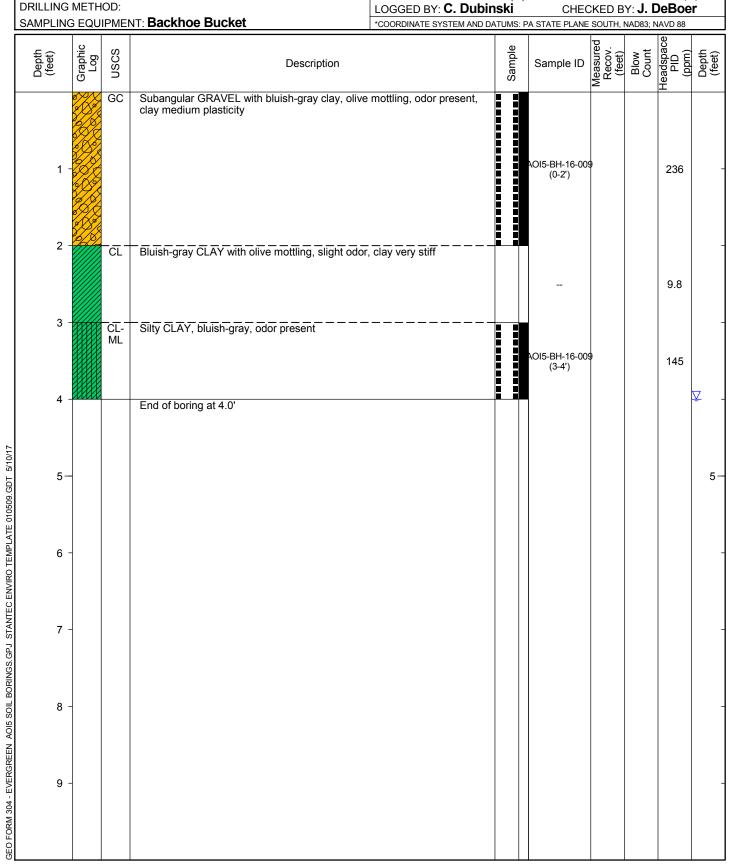
PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-007 PROJECT NUMBER: **213402567** *EASTING (ft): 2620618.95 *NORTHING (ft): 182926.3 STARTED 3/22/16 DRILLING: COMPLETED: 3/22/16 *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 4.0 BOREHOLE DEPTH (ft): 4 DRILLING COMPANY: Sweeney STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski



PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** AOI5-BH-16-008 PAGE 1 OF 1 PROJECT NUMBER: **213402567** *NORTHING (ft): 183013.62 *EASTING (ft): 2620758.97 STARTED 3/22/16 DRILLING: COMPLETED: 3/22/16 *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 4.0 BOREHOLE DEPTH (ft): 4 DRILLING COMPANY: Sweeney STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer



PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-009 PROJECT NUMBER: **213402567** *EASTING (ft): 2620890.74 *NORTHING (ft): 183101.56 STARTED 3/22/16 DRILLING: COMPLETED: 3/22/16 *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 4.0 BOREHOLE DEPTH (ft): 4 DRILLING COMPANY: Sweeney STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA



PROJECT: Marcus Hook Industrial Complex
LOCATION: AOI 5 Characterization
PROJECT NUMBER: 213402567

DRILLING: STARTED 3/23/16 COMPLETED: WELL / PROBEHOLE / BOREHOLE NO:
PAGE 1 OF 1 AOI5-BH-16-010

*NORTHING (ft): 183286.8 *EASTING (ft): 2621177.03
*TOC ELEV (ft): NA

*TOC ELEV (ft): NA

INSTALLATION: STARTED COMPLETED:

DRILLING COMPANY: Sweeney

DRILLING EQUIPMENT: Backhoe Bucket

DRILLING METHOD:

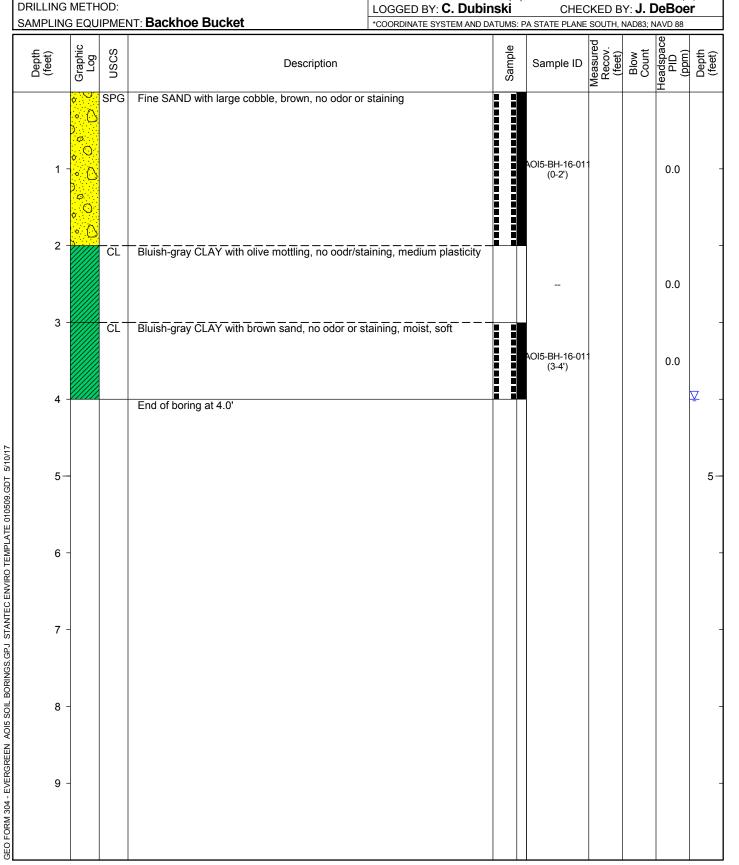
*GROUND ELEV (ft): NA
INITIAL DTW (ft): 4.0
STATIC DTW (ft): Not Measured
WELL CASING DIAMETER (in): NA
I OGGED BY: C. Dubinski

INITIAL DTW (ft): 4.0
STATIC DTW (ft): Not Measured
WELL CASING DIAMETER (in): NA
LOGGED BY: C. Dubinski

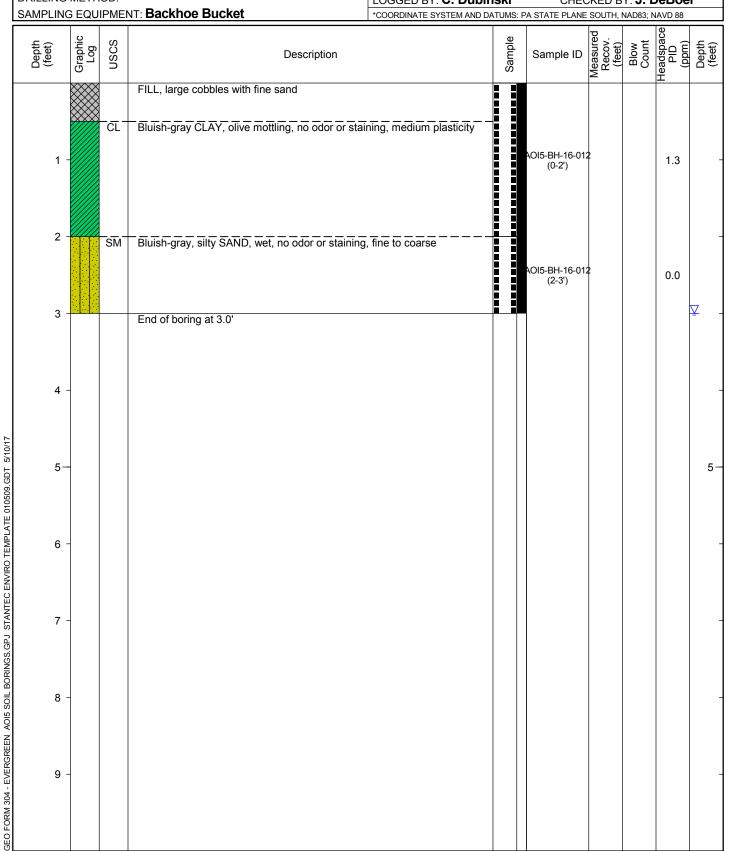
*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

SAMPLING EQUIPMENT: Backhoe Bucket Headspace PID (ppm) Sample Graphic Log **USCS** Blow Count Depth (feet) Description Sample ID SM Silty SAND, brown/gray ???, fine, odor present AOI2-BH-16-010 1 100 (0-2')CLS Sandy CLAY, sand yellow-brown with bluish-gray clay, odor and staining present, sand fine, clay firm 240 3 Bluish-gray CLAY with olive mottling, moist, odor and staining present, medium plasticity AOI2-BH-16-010 399 (3-4') End of boring at 4.0' GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17 5 5 6 7 8 9

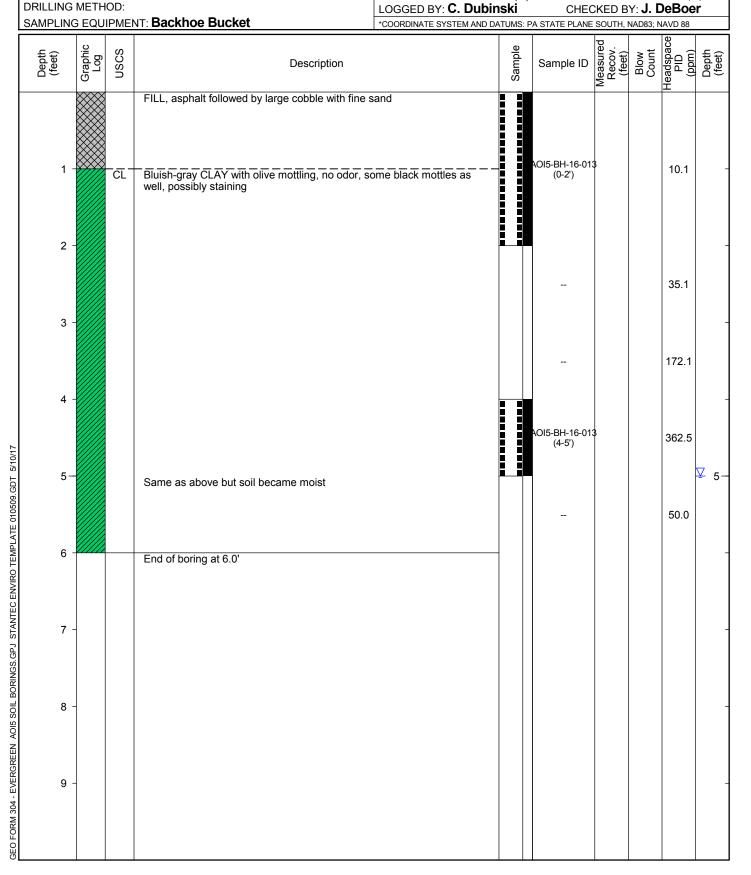
PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-011 PROJECT NUMBER: **213402567** *EASTING (ft): 2620847.86 *NORTHING (ft): 182572.3 STARTED 3/23/16 DRILLING: COMPLETED: 3/23/16 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 4.0 BOREHOLE DEPTH (ft): 4 DRILLING COMPANY: Sweeney STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA



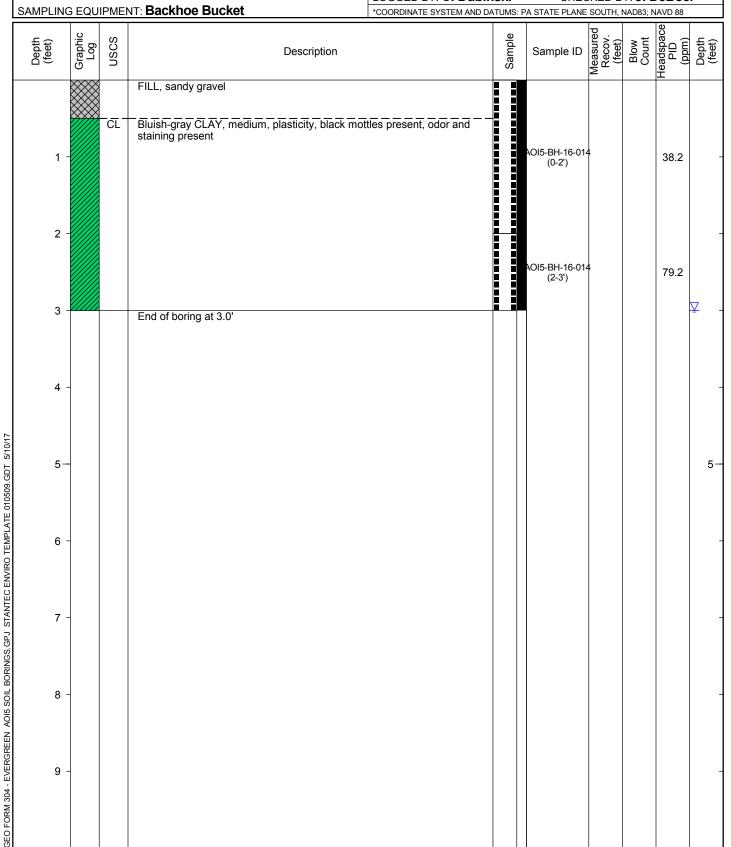
PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-012 PROJECT NUMBER: **213402567** *EASTING (ft): 2620986.4 *NORTHING (ft): 182657.02 STARTED 3/23/16 DRILLING: COMPLETED: 3/23/16 *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 3.0 BOREHOLE DEPTH (ft): 3 DRILLING COMPANY: Sweeney STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer



PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-013 PROJECT NUMBER: **213402567** *NORTHING (ft): 182747.13 *EASTING (ft): 2621122.17 STARTED 3/23/16 DRILLING: COMPLETED: 3/23/16 *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 5.0 BOREHOLE DEPTH (ft): 6 DRILLING COMPANY: Sweeney STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA



PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-014 PROJECT NUMBER: **213402567** *EASTING (ft): 2621411.75 *NORTHING (ft): 182931.5 STARTED 3/23/16 **COMPLETED: 3/23/16** DRILLING: *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 3.0 BOREHOLE DEPTH (ft): 3 DRILLING COMPANY: Sweeney STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer



PROJECT: Marcus Hook Industrial Complex LOCATION: AOI 5 Characterization

PROJECT NUMBER: 213402567

DRILLING: STARTED 3/23/16

COMPLETED: 3/23/16

COMPLETED:

INSTALLATION: STARTED DRILLING COMPANY: **Sweeney**

DRILLING EQUIPMENT: Backhoe Bucket

DRILLING METHOD:

WELL / PROBEHOLE / BOREHOLE NO:

PAGE 1 OF 1 AOI5-BH-16-015
*NORTHING (ft): 183024.44 *EASTING (ft): 2621661.88

*NORTHING (ft): **183024.44***GROUND ELEV (ft): **NA**INITIAL DTW (ft): **4**

STATIC DTW (ft): Not Measured
WELL CASING DIAMETER (in): NA
LOGGED BY: C. Dubinski

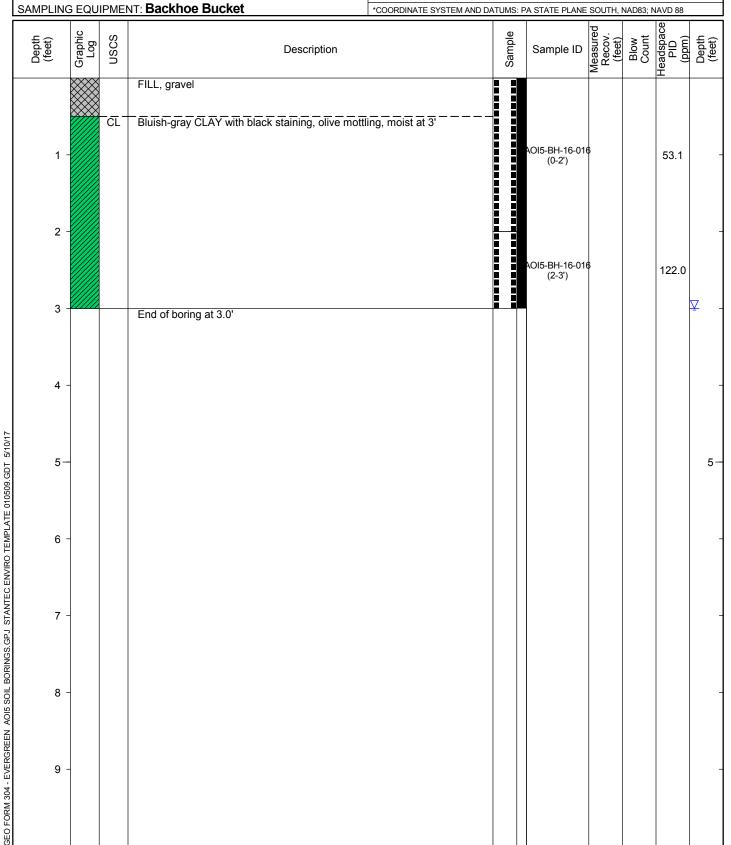
*TOC ELEV (ft): **NA**BOREHOLE DEPTH (ft): **4**WELL DEPTH (ft): **NA**BOREHOLE DIAMETER (in): **NA**

Stantec

CHECKED BY: J. DeBoer

DRILLING				DGGED BY: C. Dubinsk DORDINATE SYSTEM AND DATUN					eBoel	
SAMPLIN	I		11. Dackiloe Ducket			ı		NAD83; N	ΔVD 88	
Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (bpm)	Depth (feet)
1 -		CL	Very hard, bluish-gray CLAY, no odor or staining pro	esent		AOI5-BH-16-01\$ (0-2')			0.0	-
3		SM	Silty SAND with subangular gravel, black/brown, od to coarse	or present, sand fine		 AOI5-BH-16-015 (3-4')	;		15.3	-
5-	SECTION		End of boring at 4.0'							<u>V</u> - 5−
6										_
7										-
8										-

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-016 PROJECT NUMBER: **213402567** *EASTING (ft): 2621330.07 COMPLETED: 3/23/16 *NORTHING (ft): 182428.73 STARTED 3/23/16 DRILLING: *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 3 BOREHOLE DEPTH (ft): 3 DRILLING COMPANY: Sweeney STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer



PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: Stantec **LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-017 PROJECT NUMBER: **213402567** *EASTING (ft): 2621619.82 *NORTHING (ft): 182616.05 STARTED 3/23/16 COMPLETED: 3/23/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 4.0 BOREHOLE DEPTH (ft): 4 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA

LOGGED BY: C. Dubinski

CHECKED BY: J. DeBoer

DRILLING METHOD:

	DRILLING			— •• — • •	LOGGED BY: C. Dubin			KED B			r
Ļ	SAMPLING	EQU	IPIVIEI	1: Dackiloe Ducket	*COORDINATE SYSTEM AND DAT	IUMS: F					
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
	1 -		CL	Bluish-gray CLAY, medium plasticity, no odor/stai			AOI5-BH-16-017 (0-2')			0.0	-
										0.0	
	3 -						AOI5-BH-16-017 (3-4')	,		0.0	- ∇ -
2/17	4 -			End of boring at 4.0'							
E 010509.GDT 5/10	5 —										5-
S ENVIRO TEMPLAT	6 -										-
NGS.GPJ STANTE	7 -										-
IN AOI5 SOIL BURI	8 -										-
GEO FORM 304 - EVERGREEN AOI5 SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17	9 -										-
GEO FO											

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: Stantec **LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-018 PROJECT NUMBER: **213402567** *NORTHING (ft): 182768.14 *EASTING (ft): **2621818.45** STARTED 3/23/16 COMPLETED: 3/23/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 1.0 BOREHOLE DEPTH (ft): 1 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer

	SAMPLING			NT: Backhoe Bucket	*COORDINATE SYSTEM AND DA		· P				Jeroe	r
ו	O/ WIT EII TO			Tr. Backing Backet	COORDINATE OTOTEWAND DA		П					
	Depth (feet)	Graphic Log	nscs	Description		Sample		Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
•				Large COBBLES with coarse sand, gray/brown, r				AOI-BH-16-018 (0-1')			0.0	
	1 -			End of boring at 1.0'								<u>V</u> -
	2 -											_
	3 -											-
	4 -											-
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17	5-											5-
ENVIRO TEMPLATE	6 -	_										-
NGS.GPJ STANTEC	7 -											-
EN AOIS SOIL BORII	8 -											-
RM 304 - EVERGREE	9 -											-
GEO FOR												

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: Stantec LOCATION: AOI 5 Characterization AOI5-BH-16-023 PAGE 1 OF 1 PROJECT NUMBER: **213402567** *EASTING (ft): 262226.82 *NORTHING (ft): 182828.41 DRILLING: STARTED 3/29/16 COMPLETED: 3/29/16 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 3.0 BOREHOLE DEPTH (ft): 3 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer

SAMPLING	<u>G EQU</u>	IPMEN	NT: Backhoe Bucket	COORDINATE SYSTEM AND DA	TUMS: F	A STATE PLANE	SOUTH, I			
Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1 -		GW- SW	Subangular GRAVEL with coarse beige sand, odo			AOI5-BH-16-023 (0-2)			0.0	-
2 :		GC	Subangular GRAVEL with bluish-gray clay, very m present			AOI5-BH-16-02: (2-3)	3		4.7	- ∀ -
4	-		End of boring at 3.0'							-
5-										5-
6	-									-
7										-
8 -	-									-
5 - 6 - 8 -										

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-024 PROJECT NUMBER: **213402567** *NORTHING (ft): 183050.64 *EASTING (ft): 2622432.55 STARTED 3/29/16 COMPLETED: 3/29/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 2.0 BOREHOLE DEPTH (ft): 2 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer

L	SAMPLING	EQU	IPME	NT: Backhoe Bucket	*COORDINATE SYSTEM AND DATUM			SOUTH, I			
	Depth (feet)	Graphic Log	nscs	Description	-	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
	1 -		GW- SW	Small, subangular GRAVEL with coarse sand, or present, black	lor and staining		AOI5-BH-16-024 (0-2)			96.0	<u>-</u>
	۲			End of boring at 2.0'							
	3 -										_
	4 -										-
10509.GDT 5/10/17	5-										5-
VVIRO TEMPLATE 01	6 -										_
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17	7 -										-
AOI5 SOIL BORING	8 -										-
304 - EVERGREEN	9 -										-
GEO FORM											

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-025 PROJECT NUMBER: **213402567** *NORTHING (ft): 183122.68 *EASTING (ft): **2622547.13** STARTED 3/29/16 COMPLETED: 3/29/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 2.0 BOREHOLE DEPTH (ft): 2 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer

	SAMPLING			NT: Backhoe Bucket	*COORDINATE SYSTEM AND DAT				IAVD 88	r
	Depth (feet)	Graphic	nscs	Description		Sample		Measured Recov. (feet)	Headspace PID (ppm)	Depth (feet)
	1 -		GW- SW	Small, subangular GRAVEL with coarse sand, bla	ack, odor and staining		AOI5-BH-16-029 (0-2)		279.9	<u>-</u>
	3 -			End of boring at 2.0'						-
17	4 -									-
E 010509.GDT 5/10/	5-									5-
C ENVIRO TEMPLATI	6 -	-								
RINGS.GPJ STANTER	7 -									
EEN AOIS SOIL BOF	8 -									
GEO FORM 304 - EVERGREEN AOI5 SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17	9 -	_								-

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: Stantec **LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-026 PROJECT NUMBER: **213402567** *NORTHING (ft): 183142.65 *EASTING (ft): 2622649.56 STARTED 3/29/16 COMPLETED: 3/29/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 3 BOREHOLE DEPTH (ft): 3 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer

SAMPLIN	G EQU	IPME		OORDINATE SYSTEM AND DATUM			SOUTH, N	NAD83; N	AVD 88	
Depth (feet)	Graphic Log	nscs	Description	O Signal	Sallipia	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
2		SP	Beige, fine SAND, no odor or staining Subangular GRAVEL with sandy clay, sand fine, clar bluish gray, odor and staining present	y very malleable,		AOI5-BH-16-026 (0-2) AOI5-BH-16-026 (2-3)			297.8	-
3			End of boring at 3.0'			(2-3)				Д -
4	=									-
5.										5-
	-									-
7	_									-
S SOLL BOTH	_									-
250 FORM 344 - EVERGREEN AUG SOIL BORINGS, GFJ. STANIEC ENVIRO. IEMPLA IE UTUSOB, GDJ. STONIEC ENVIRO. IEMPLA IEMP	_									-

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: Stantec **LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-027 PROJECT NUMBER: **213402567** *NORTHING (ft): 183054.11 *EASTING (ft): 2622586.19 STARTED 3/29/16 COMPLETED: 3/29/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 3.0 BOREHOLE DEPTH (ft): 3 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer

	DRILLING				LOGGED BY: C. Dubinsk		CHECKED			r
Ŀ	SAMPLING	<u> EQU</u>	<u>IPMEN</u>	NT: Backhoe Bucket	*COORDINATE SYSTEM AND DATU	JMS: P	A STATE PLANE SOUT	I, NAD83; N	NAVD 88	
	Depth (feet)	Graphic Log	SOSO	Description		Sample	Measured OI aldmes Recov.	Blow Count	Headspace PID (ppm)	Depth (feet)
	1 -		GP	Subangular GRAVEL with grayish-brown sand, of sand fine			AOI5-BH-16-027 (0-2)		39.6	-
	3 -						AOI5-BH-16-027 (2-3)		9.4	<u> </u>
	4 -			End of boring at 3.0'						-
200000000000000000000000000000000000000	5-	_								5-
ENVINO LEWIFLA	6 -	-								-
KINGO.GPJ OIANIEC	7 -	-								-
KEEN AOIS SOIL DO	8 -									-
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS, GPJ STANTEC ENVIRO LEMPLATE UTUSUS, GDT STUTT	9 -									-

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-028 PROJECT NUMBER: **213402567** *NORTHING (ft): 183164.35 *EASTING (ft): 2622741.58 STARTED 3/28/16 COMPLETED: 3/28/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 4 BOREHOLE DEPTH (ft): 4 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer

SAMPLING	METH G EQU		NT: Backhoe Bucket	*COORDINATE SYSTEM AND DATUM			D BY: J. I TH, NAD83;		•
Depth (feet)	Graphic Log	nscs	Description		Sample	Measured Dispose	(feet) Blow Count	Headspace PID (ppm)	Depth (feet)
1 -		GC	Medium subangular GRAVEL with sandy clay, o clay bluish-gray with coarse sand	dor/staining present,		AOI5-BH-16-028 (0-2')		5.9	
2		ĞP	Medium black, subangular GRAVEL, product vis	ible throughout				9.3	
3 -						AOI5-BH-16-028 (3-4')		19.9	∇
			End of boring at 4.0'						_
5 –									5-
6									
5 - 6 - 8 -									
8	_								
9									

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: Stantec **LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-029 PROJECT NUMBER: **213402567** *EASTING (ft): 2622755.47 *NORTHING (ft): 183104.46 STARTED 3/28/16 COMPLETED: 3/28/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 1 BOREHOLE DEPTH (ft): 1 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer

AMPLIN		IPMEI	NT: Backhoe Bucket	COORDINATE SYSTEM AND DAT	TUMS:					
Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth
		GC	Medium subangular GRAVEL with sandy clay, bluis corase sand, sheen present	sh gray clay with		AOI5-BH-16-029 (0-1')			0.0	<u> </u>
1	71111		End of boring 1.0'							-
2	_									
3	_									
4										
5										
6	_									
7	_									
8	_									
9	_									

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: Stantec **LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-030 PROJECT NUMBER: **213402567** *NORTHING (ft): 183135.71 *EASTING (ft): 2622701.65 STARTED 3/28/16 COMPLETED: 3/28/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 4.0 BOREHOLE DEPTH (ft): 4 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): **NA** LOGGED BY: **C. Dubinski** BOREHOLE DIAMETER (in): NA DRILLING METHOD: CHECKED BY: J. DeBoer

	DRILLING				LOGGED BY: C. Dubins	ski	CHEC	KED B	Y: J. C	DeBoe	r
L	SAMPLING	EQU	IPMEN	NT: Backhoe Bucket	*COORDINATE SYSTEM AND DA	TUMS: F	PA STATE PLANE S	SOUTH, N	NAD83; N	IAVD 88	
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
	1 -		GPS SC	Sandy GRAVEL, gravel subangular, medium size present Dark bluish-gray, clayey SAND, odor present, san plasticity	, sand coarse, odor		AOI5-BH-16-030 (0-2')			11.4	-
	2 -						4OI5-BH-16-030 (2-3')			19.9	-
	4 -						-			10.6	✓ -
710/17	4 -			End of boring at 4.0'							-
ENVIRO TEMPLATE 010509.GDT 5/10/17	5-										5-
C ENVIRO TEMPLA	6 -										-
INGS.GPJ STANTE	7 -										-
EN AOI5 SOIL BOR	8 -										-
GEO FORM 304 - EVERGREEN AOI5 SOIL BORINGS.GPJ STANTEC	9 -										<u>-</u>
GEO FO											

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-031 PROJECT NUMBER: **213402567** *EASTING (ft): 2622696.44 *NORTHING (ft): 183188.66 STARTED 3/28/16 COMPLETED: 3/28/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 4 BOREHOLE DEPTH (ft): 4 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer

	DRILLING			NT: Backhoe Bucket	LOGGED BY: C. Dubins			ED BY: J.		er
늗	SAMPLING	EQU	IPIVIEI	NI. Backiloe Bucket	*COORDINATE SYSTEM AND DAT	IUMS: F				
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID Weasured	(feet) Blow	Headspace PID (ppm)	Depth (feet)
	1 -		GC	Subangular GRAVEL with sandy clay, slight odo	r present		(OI5-BH-16-0.31 (0-2')		0.0	-
	2 -		GC	Same as above with stronger odor			-		0.0	_
	4 -			End of boring at 4.0'			vOl5-BH-16-0.31 (3-4')		0.0	<u> </u>
010509.GDT 5/10/17	5 –									5-
ENVIRO TEMPLATE 010509.GDT 5/10/17	6 -									-
RINGS.GPJ STANTEC	7 -									-
REEN AOI5 SOIL BOR	8 -									-
GEO FORM 304 - EVERGREEN AOI5 SOIL BORINGS.GPJ STANTEC	9 -									-

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-032 PROJECT NUMBER: **213402567** *NORTHING (ft): 183424.79 *EASTING (ft): 2623031.51 STARTED 3/28/16 COMPLETED: 3/28/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 5 BOREHOLE DEPTH (ft): 5 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer

	SAMPLING			NT: Backhoe Bucket	*COORDINATE SYSTEM AND DAT					IAVD 88	1
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
	1 -		GW- SW	Subangular GRAVEL with fine to coarse sand, no			AOI5-BH-16-032 (0-2')			0.0	
	3 -		-CL	Bluish-gray, hard CLAY with olive mottling, no od	or/staining					0.0	-
/10/17	4 -		-cī-	Same as above but clay begins to moisten, beco	mes malleable		 AOI5-BH-16-032 (4-5')	2		0.0	-
ATE 010509.GDT 5	5-			End of boring at 5.0'							<u>¥</u> 5−
EC ENVIRO TEMPL	6 -										_
RINGS.GPJ STANTE	7 -										
EN AOI5 SOIL BOF	8 -										
GEO FORM 304 - EVERGREEN AOI5 SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17	9 -										_

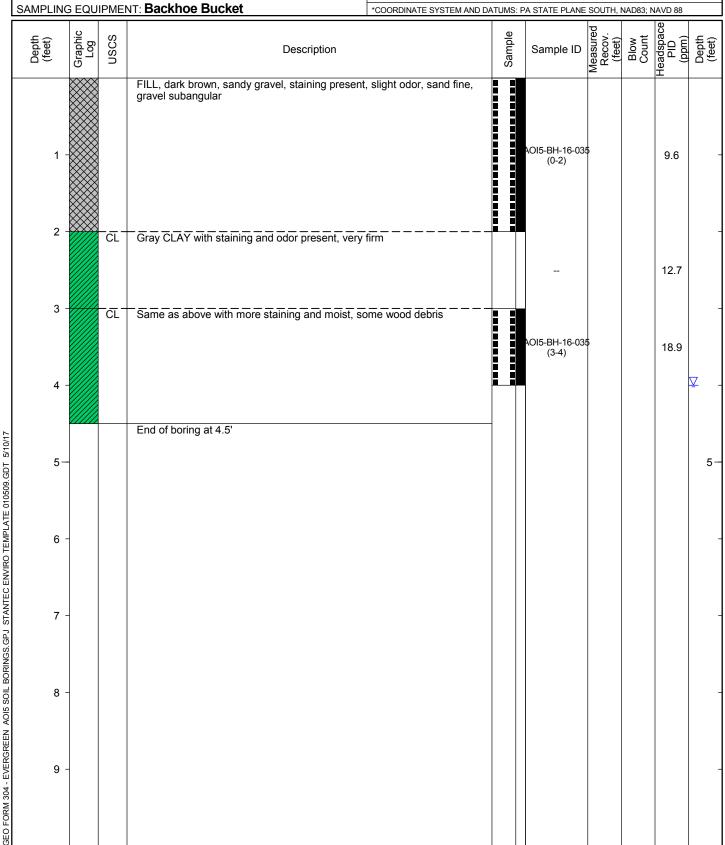
PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-033 PROJECT NUMBER: **213402567** *NORTHING (ft): 183374.84 *EASTING (ft): 2623109.63 STARTED 3/28/16 COMPLETED: 3/28/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 2 BOREHOLE DEPTH (ft): 2 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer

	DRILLING			NT. Bookhoo Buokot	LOGGED BY: C. Dubins		CHEC				r
Ļ	SAMPLING	EQU و	IPME	NT: Backhoe Bucket	*COORDINATE SYSTEM AND DAT	UMS: P					
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
	1 -		GC	Medium subangular GRAVEL with bluish-gray, san Refusal at 2.0'. Moved North 10'	ndy clay, odor present		AOI5-BH-16-033 (0-2')			0.0	⊻ .
	3 -										-
117	4 -										-
TE 010509.GDT 5/10/	5-										5-
TEC ENVIRO TEMPLA	6 -										-
BORINGS.GPJ STAN	7 -										-
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17	8 -										-
GEO FORM 304 - EVE	9 -										-

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: Stantec **LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-034 PROJECT NUMBER: **213402567** *NORTHING (ft): 183495.97 *EASTING (ft): 2623146.09 STARTED 3/28/16 COMPLETED: 3/28/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 3 BOREHOLE DEPTH (ft): 3 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer

SAMPLING		IPMEN	T: Backhoe Bucket *coord	DINATE SYSTEM AND DATUMS:				<u> </u>
Depth (feet)	Graphic Log	nscs	Description	Sample	Sample ID	Measured Recov. (feet) Blow	Count Headspace PID (ppm)	Depth
1 -		GW- SW	Large subangular GRAVEL with brown, fine sand, slight		AOI5-BH-16-034 (0-2')		6.9	
2 -		GW- SW	Same as above but bluish-gray sand		AOI5-BH-16-034 (2-3')		12.4	
3 -	<u>.</u> . U.		Refusal at 3.0'. Moved North 10'					<u>V</u>
4 -								
5-								
6 -								
7 -								
8 -								
9 -								

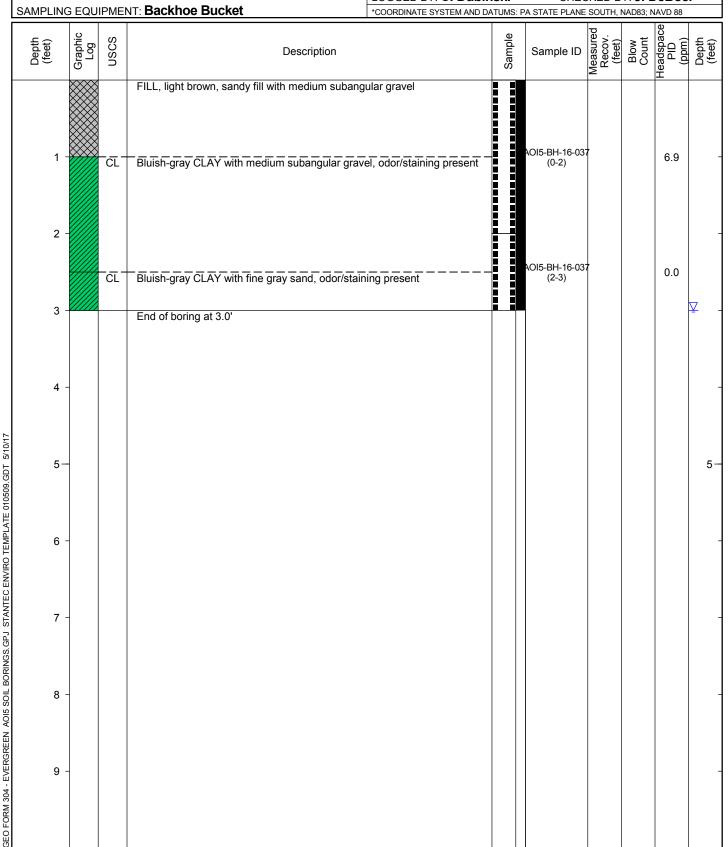
PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-035 PROJECT NUMBER: **213402567** *NORTHING (ft): 182076.42 *EASTING (ft): 2621073.4 STARTED 3/24/16 DRILLING: COMPLETED: 3/24/16 *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 4 BOREHOLE DEPTH (ft): 4.5 DRILLING COMPANY: Sweeney STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer



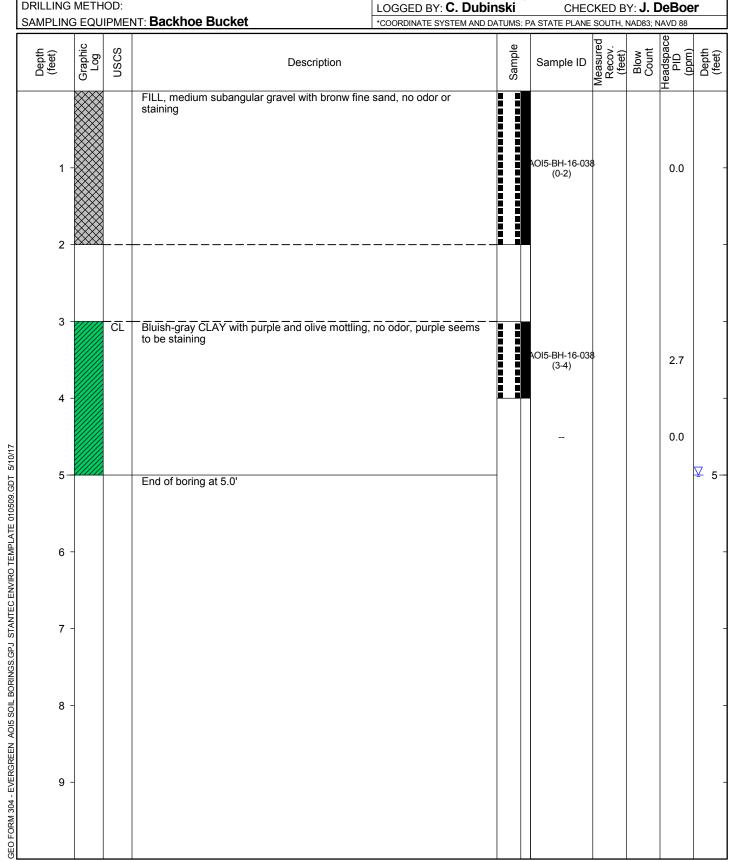
PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: Stantec LOCATION: AOI 5 Characterization AOI5-BH-16-036 PAGE 1 OF 1 PROJECT NUMBER: **213402567** *EASTING (ft): 2621228.55 STARTED 3/24/16 *NORTHING (ft): 182167.07 COMPLETED: 3/24/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 4 BOREHOLE DEPTH (ft): 4 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer

DRILLING			III. Paakhaa Buakat	OGGED BY: C. Dubinski		BY: J. DeBo	
SAMPLING	∍ EQU	IPME	NT: Backhoe Bucket	COORDINATE SYSTEM AND DATUMS:	PA STATE PLANE SOUT	H, NAD83; NAVD 88	
Depth (feet)	Graphic Log	nscs	Description	Sample	Measured Recov.	H. NAD83; NAVD 88 Count Headspace Headspace	Depth (feet)
1 -		GW- SW	Medium subangular GRAVEL with coarse sand, st present	aining and odor	AOI5-BH-16-036 (0-2)	44.0	
3 -		CL	Bluish-gray CLAY with medium subangular gravel, present, medium plasticity	staining and odor	AOI5-BH-16-036 (2-3)	125.1	-
4 -			End of boring at 4.0'			53.2	<u> </u>
10509.GDT 5/10/17	_						5-
ENVIRO TEMPLATE O	-						_
RINGS, GPJ STANIEC	_						-
REEN AOIS SOIL BOR	_						-
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS, GPJ STANTEC ENVIRO TEMPLATE 010509, GDT 5/10/17 6 8 2 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	-						-
GEO FOR							

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** AOI5-BH-16-037 PAGE 1 OF 1 PROJECT NUMBER: **213402567** *NORTHING (ft): 182018.8 *EASTING (ft): 2621322.29 STARTED 3/24/16 DRILLING: COMPLETED: 3/24/16 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 3 BOREHOLE DEPTH (ft): 3 DRILLING COMPANY: Sweeney STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer



PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-038 PROJECT NUMBER: **213402567** COMPLETED: 3/24/16 *NORTHING (ft): 181933.75 *EASTING (ft): 2621174.29 STARTED 3/24/16 DRILLING: *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 5 BOREHOLE DEPTH (ft): 5 DRILLING COMPANY: Sweeney STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski



PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-039 PROJECT NUMBER: **213402567** *NORTHING (ft): 181818.98 *EASTING (ft): **2621362.04** STARTED 3/24/16 DRILLING: COMPLETED: 3/24/16 *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 3 BOREHOLE DEPTH (ft): 5 DRILLING COMPANY: Sweeney STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA

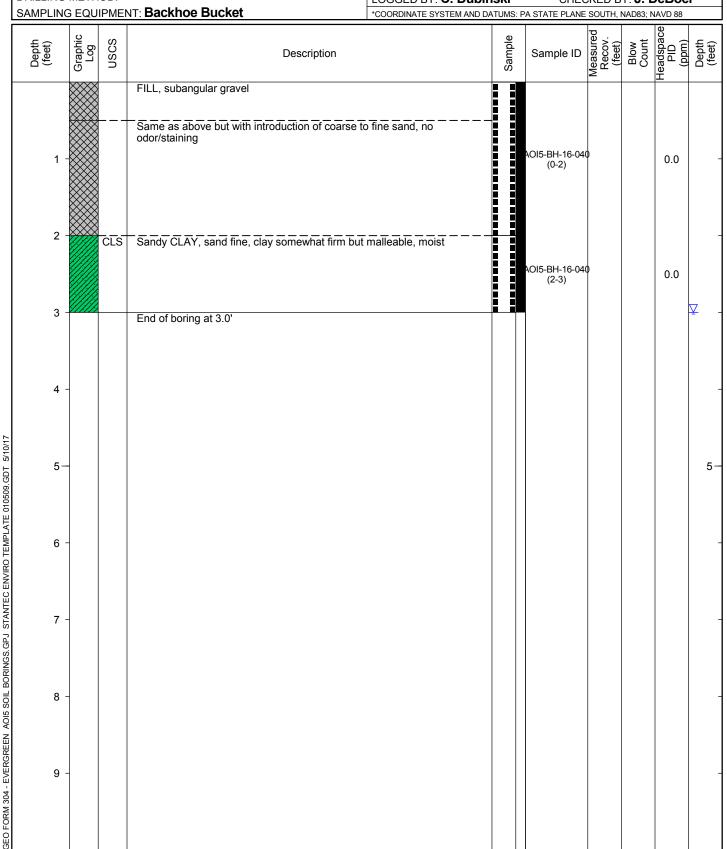
LOGGED BY: C. Dubinski

CHECKED BY: J. DeBoer

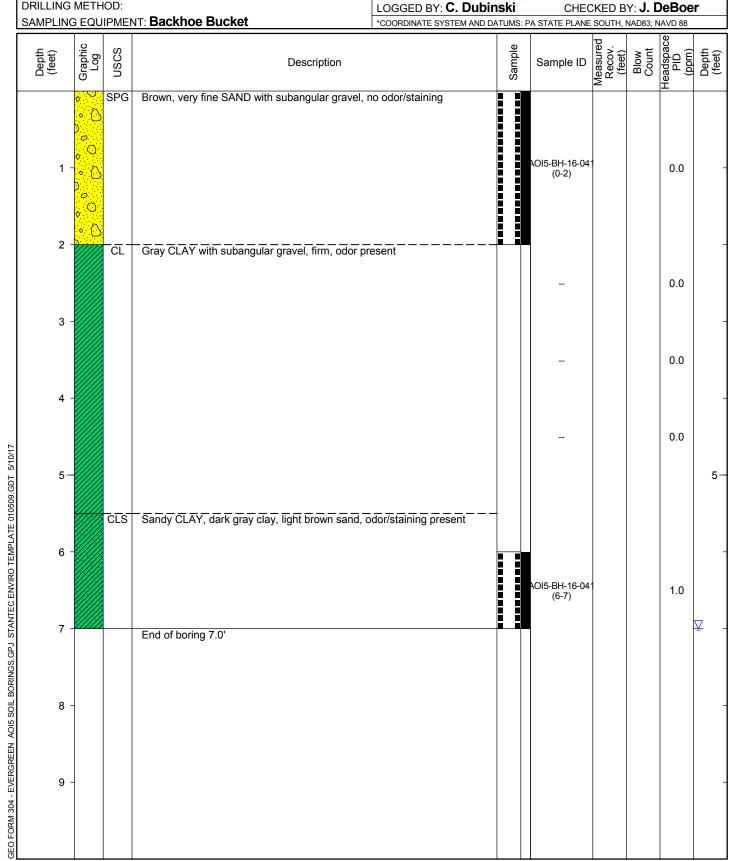
DRILLING METHOD:

SAMPLING EQUIPMENT: Backhoe Bucket *COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88 Sample Graphic Log **USCS** Blow Count Depth (feet) Description Sample ID FILL, subangular gravel CLS Sandy CLAY, medium plasticity, no odor/staining AOI5-BH-16-039 1 0.0 (0-2)2 Dark gray CLAY hard, no odor/staining, some olive mottling AOI5-BH-16-039 0.0 (2-3)3 0.0 CLAY with subrounded, small cobble, odor present, wet 0.0 GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17 5 5 End of boring at 5.0' 6 7 8 9

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** AOI5-BH-16-040 PAGE 1 OF 1 PROJECT NUMBER: **213402567** *NORTHING (ft): 181716.55 *EASTING (ft): 2621426.71 STARTED 3/24/16 COMPLETED: 3/24/16 DRILLING: *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 3.0 BOREHOLE DEPTH (ft): 3 DRILLING COMPANY: Sweeney STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski CHECKED BY: J. DeBoer



PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-041 PROJECT NUMBER: **213402567** *EASTING (ft): 2621489.21 *NORTHING (ft): 181896.24 STARTED 3/24/16 COMPLETED: 3/24/16 DRILLING: *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 7 BOREHOLE DEPTH (ft): 7 DRILLING COMPANY: Sweeney STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: C. Dubinski



PROJECT: Marcus Hook Industrial Complex LOCATION: AOI 5 Characterization PROJECT NUMBER: 213402567

DRILLING EQUIPMENT: Backhoe Bucket

PAGE 1 OF 1 AOI5-BH-16-042

Stantec

DRILLING: STARTED 3/24/16

COMPLETED: **3/24/16** COMPLETED:

*NORTHING (ft): **181773.41***GROUND ELEV (ft): **NA**

WELL / PROBEHOLE / BOREHOLE NO:

INSTALLATION: STARTED
DRILLING COMPANY: **Sweeney**

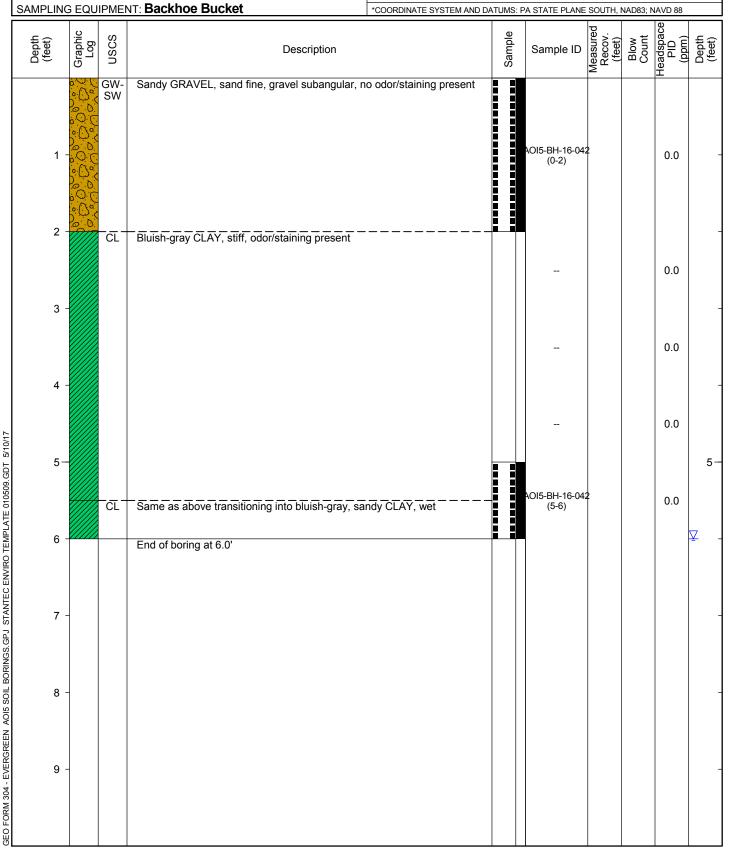
INITIAL DTW (ft): 6
STATIC DTW (ft): Not Measured

*EASTING (ft): **2621470.98***TOC ELEV (ft): **NA**BOREHOLE DEPTH (ft): **6**WELL DEPTH (ft): **NA**

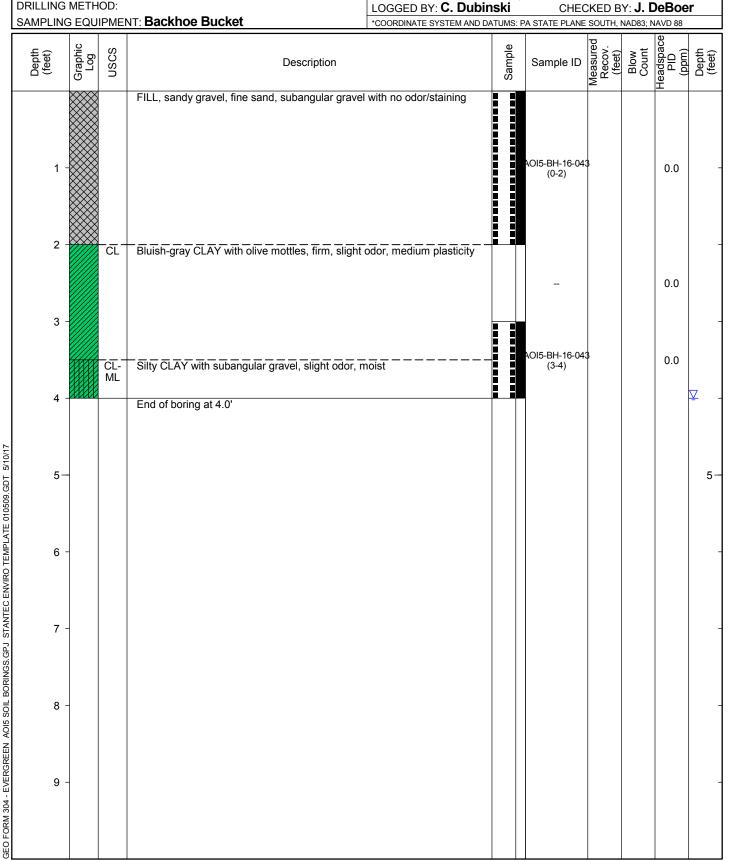
DRILLING METHOD:

WELL CASING DIAMETER (in): **NA** LOGGED BY: **C. Dubinski**

BOREHOLE DIAMETER (in): **NA** CHECKED BY: **J. DeBoer**



PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** AOI5-BH-16-043 PAGE 1 OF 1 PROJECT NUMBER: **213402567** *EASTING (ft): 2621476.62 *NORTHING (ft): 181676.62 STARTED 3/24/16 COMPLETED: 3/24/16 DRILLING: *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 4 BOREHOLE DEPTH (ft): 4 DRILLING COMPANY: Sweeney STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD:



PROJECT: Marcus Hook Industrial Complex **LOCATION: AOI 5 Characterization**

PROJECT NUMBER: **213402567**

STARTED 3/28/16 DRILLING:

INSTALLATION: STARTED DRILLING COMPANY: Sweeney

DRILLING EQUIPMENT: Backhoe Bucket

DRILLING METHOD:

SAMPLING EQUIPMENT: Backhoe Bucket

WELL / PROBEHOLE / BOREHOLE NO:

PAGE 1 OF 1 AOI5-BH-16-044

*NORTHING (ft): 181957.62 *GROUND ELEV (ft): NA INITIAL DTW (ft): 9

COMPLETED: 3/28/16

COMPLETED:

STATIC DTW (ft): Not Measured WELL CASING DIAMETER (in): NA

LOGGED BY: C. Dubinski

*EASTING (ft): 2621714.18 *TOC ELEV (ft): NA BOREHOLE DEPTH (ft): 9 WELL DEPTH (ft): NA BOREHOLE DIAMETER (in): NA

Stantec

CHECKED BY: J. DeBoer

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88 Sample Graphic Log **USCS** Blow Count Depth (feet) Description Sample ID FILL, brown, coarse sand with subangular gravel AOI5-BH-16-044 0.0 (0-2')Bluish-gray CLAY, odor present, medium plasticity 0.0 3 0.0 2.7 GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17 5-5 4.4 6 ĊĹ Same as above but clay more flaky, some olive mottling 4.4 7 5.3 8 SP Transitioned over to bluish-gray, fine SAND, odor present AOI5-BH-16-044 19.4 (8-9')9 Refusal at 9.0'. Moved North 15'

PROJECT: Marcus Hook Industrial Complex **LOCATION: AOI 5 Characterization**

PROJECT NUMBER: **213402567**

STARTED 6/9/16 COMPLETED: **6/9/16** INSTALLATION: STARTED COMPLETED:

DRILLING COMPANY: **Sweeney**

DRILLING EQUIPMENT: Backhoe Bucket

DRILLING METHOD:

DRILLING:

SAMPLING FOLIPMENT: Backhoe Bucket

WELL / PROBEHOLE / BOREHOLE NO:

AOI5-BH-16-045 PAGE 1 OF 1

*NORTHING (ft): 184324.02 *GROUND ELEV (ft): **NA** INITIAL DTW (ft): 4

STATIC DTW (ft): Not Measured WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA

LOGGED BY: **D. Downing**

*EASTING (ft): 2623082.7 *TOC ELEV (ft): **NA** BOREHOLE DEPTH (ft): 6 WELL DEPTH (ft): **NA**

Stantec

CHECKED BY: A. Patel

3	SAMPLING	IPLING EQUIPMENT: Backhoe Bucket		COORDINATE SYSTEM AND DA	TUMS: F	PA STATE PLANE SOUTH, NAD83; NAVD 88					
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID PID (ppm)	Depth (feet)
	1 -		SP- SM	brown SILT and grey fine SAND, damp/moist			AOI5-BH-16 -045-0-2			0	-
	2 -		ML	brown to grey SILT, little fine SAND, trace wood, o	lamp/moist		-			7.4	
	4 -		ML	brown to dark grey SILT, staining, wet			AOIE DIL 40				<u> </u>
	5 - 6 -			End of boring at 6 ft bgs			AOI5-BH-16 -045-4-6			32	5-
	7 -			Lite of builing at o it bys							-
	8 -										-
21/01/6	9 -										10-
E UTUSOR.GD	11 -										-
A LEIMPLA	12 -										-
ANIECEIV	13 - 14 -										
ט יינט.טטוא	15-										15-
OIS SOIL DOF	16 -										-
EKGKEEN A	17 -										-
GEO FORM 304 - EVERGREEN AUIS SUIL BORINGS, GPJ STANTEC ENVIRO TEMPLATE 010509, GDT 3/10/17	18 - 19 -										1

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: Stantec **LOCATION: AOI 5 Characterization** AOI5-BH-16-046 PAGE 1 OF 1 PROJECT NUMBER: **213402567** *NORTHING (ft): 184292.1 *EASTING (ft): 2623134.75 DRILLING: STARTED 6/9/16 COMPLETED: **6/9/16** *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 4 BOREHOLE DEPTH (ft): 4

DRILLING COMPANY: **Sweeney**DRILLING EQUIPMENT: **Backhoe Bucket**DRILLING METHOD:

STATIC DTW (ft): **Not Measured**WELL CASING DIAMETER (in): **Not Measured**WELL CASING DIAMETER (in): **Not Measured**WELL CASING DIAMETER (in): **Not Measured**

SAMPLING FOLLIDMENT Backhoo Rucket

WELL CASING DIAMETER (in): NA
LOGGED BY: D. Downing

CHECKED BY: A. Patel

WELL DEPTH (ft): **NA**

SAMPLIN	G EQU	IPME	NT: Backhoe Bucket	*COORDINATE SYSTEM AND DA			SOUTH, I			
Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1 2			FILL; dark drown to dark grey silt and fine sand, v fragments, some fine gravel, wet [sulfur dioxide=			AOI5-BH-16 -046-0-2			14.7	-
3	_	ML	dark brown SILT, some fine sand, little fine grave	I, wet		AOI5-BH-16 -046-2-6			4.7	-
4			End of boring at 4 ft bgs							∑ _
5-										5-
6										_
7 8										_
9										_
10-										10-
11	_									_
12	_									-
13	_									=
14	-									-
15-	-									15-
16	-									-
17										-
10 - 11										_
19										_

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** AOI5-BH-16-047 PAGE 1 OF 1 PROJECT NUMBER: **213402567** *NORTHING (ft): 184212.3 *EASTING (ft): 2623151.97 DRILLING: STARTED 6/8/16 COMPLETED: **6/8/16** *GROUND ELEV (ft): NA *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 8 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: **D. Downing** CHECKED BY: A. Patel

Į	SAMPLING	EQU	IPME		COORDINATE SYSTEM AND DAT		PA STATE PLANE				
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
İ			ML	dark grey SILT, some staining						_	
	1 -						AOI5-BH-16 -047-0-2			7.7	-
	2 -										-
	3 -						-			4.7	-
	4 -										-
	5-						-			1.8	5-
	6 -		ML	black SILT, staining, (potentially acid sludge) [Hydr ppm]	ogen sulfide = 4.2		ĺ				1
	7 -			, pp]			AOI5-BH-16 -047-6-8			7.6	-
	8 -			End of boring at 8 ft bgs							-
5/10/1/	9 -										-
0509.GD I	10-										10-
MPLAIE 01	11 - 12 -										
	12										
I EC ENVI	13 -										-
GPJ SIAN	14 -										-
BORINGS	15—										15-
AUI5 SUIL	16 -										-
REEN	17 -										
04 - EVERC	18 -										-
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17	19 -										-
5											

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: Stantec **LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-048 PROJECT NUMBER: **213402567** *NORTHING (ft): 184261 *EASTING (ft): 2623085.04 STARTED 6/9/16 COMPLETED: **6/9/16** DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 8 BOREHOLE DEPTH (ft): 9 DRILLING COMPANY: **Sweeney** WELL DEPTH (ft): **NA**

DRILLING EQUIPMENT: Backhoe Bucket

DRILLING METHOD:

STATIC DTW (ft): Not Measured

WELL CASING DIAMETER (in): NA

LOGGED BY: D. Downing

LOGGED BY: **D. Downing**CHECKED BY: **A. Patel**COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

BOREHOLE DIAMETER (in): NA

		ILINIFL	NT: Backhoe Bucket	*COORDINATE SYSTEM AND DA	TUMS: F	PA STATE PLANE	SOUTH. I	NAD83: N	AVD 88	
			VII Duoinio Duoino	COCKBINATE CTOTEMINATE BAC			σ	17 (DOO, 14	9	
(ופפו)	Graphic Log	nscs	Description		Sample	Sample ID	Measure Recov. (feet)	Blow Count	Headspar PID (ppm)	Depth (feet)
		ML	brown SILT, dry [Hydrogen sulfide = 0.8 ppm]							
1 -						AOI5-BH-16 -048-0-2			0.8	-
2 -		ML	brown SILT, little medium gravel, moist [Sulfur di	oxide = 0.1 ppm]						-
3 -						-			2.4	-
4 -		ML	brown SILT, litle staining, moist							-
5-						-			62.5	5-
6 -										-
7 -						AOI5-BH-16 -048-6-8			133.8	-
8 -		ML	brown SILT, some clay, staining, wet			-			62.9	⊻ -
9 -			End of boring at 9 ft bgs							-
10-										10-
11 -										-
12 -										-
13 -										-
14 -										-
15-										15-
16 -										-
17 -										_
18 -										_
19 -										-
	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10 - 11 - 12 - 13 - 16 - 17 - 18 - 18 - 18 - 18 - 18 - 18 - 18	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10 - 11 - 12 - 13 - 14 - 15 - 16 - 17 - 18 - 18 - 18 - 18 - 18 - 18 - 18	ML 1 -	ML brown SILT, dry [Hydrogen sulfide = 0.8 ppm] ML brown SILT, little medium gravel, moist [Sulfur di ML brown SILT, little staining, moist ML brown SILT, some clay, staining, wet ML brown SILT, some clay, staining, wet End of boring at 9 ft bgs 10— 11 - 12 - 13 - 14 - 15— 16 - 17 - 18 -	ML brown SILT, dry [Hydrogen sulfide = 0.8 ppm] ML brown SILT, little medium gravel, moist [Sulfur dioxide = 0.1 ppm] ML brown SILT, little staining, moist ML brown SILT, some clay, staining, wet End of boring at 9 ft bgs End of boring at 9 ft bgs	ML brown Sil.T, dry [Hydrogen sulfide = 0.8 ppm] ML brown Sil.T, little medium gravel, moist [Sulfur dioxide = 0.1 ppm] ML brown Sil.T, little staining, moist ML brown Sil.T, some clay, staining, wet End of boring at 9 ft bgs 10	ML brown SILT, dry [Hydrogen sulfide = 0.8 ppm] ACIS-BH-16 od8-0-2 ML brown SILT, little medium gravel, moist [Sulfur dioxide = 0.1 ppm]	1 - ML brown SILT, little medium gravel, moist [Sulfur dioxide = 0.1 ppm] 3 - ML brown SILT, little staining, moist 5 - 6 - 7 - 8 - ML brown SILT, some clay, staining, wet 9 - End of boring at 9 ft bgs 10 - 11 - 12 - 13 - 14 - 15 - 16 - 17 - 18 - 18 - 18 - 18 - 18 - 18 - 18	1 -	ML brown SILT, dry [Hydrogen sulfide = 0.8 ppm] AOIS-BH-16 -048-0-2 ML brown SILT, little medium gravel, moist [Sulfur dioxide = 0.1 ppm] - 2.4 ML brown SILT, little staining, moist - 62.5 ML brown SILT, some clay, staining, wet 9 End of boring at 9 ft bgs 133.8 141 - 15 - 165 -

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-049 PROJECT NUMBER: **213402567** *NORTHING (ft): 184730.21 *EASTING (ft): 2622692.26 STARTED 6/8/16 COMPLETED: **6/8/16** DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 2 BOREHOLE DEPTH (ft): 4 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: **D. Downing** CHECKED BY: A. Patel

Ŀ	SAMPLING	EQU	IPME	NT: Backhoe Bucket *c	OORDINATE SYSTEM AND DAT			SOUTH, I	NAD83; N	AVD 88	
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
┢			ML	grey SILT, some brown tint, damp							
	1 -						AOI5-BH-16 -049-0-2			0	-
	2 -		ML	grey to dark grey SILT, trace fine sand, some brown	n staining, wet						⊻ -
	3 -	-					AOI5-BH-16 -049-3-4			68.8	-
	4 -			End of boring at 4 ft bgs							-
	5-	_									5-
	6 -										-
	7 -	.									-
	8 -	-									
0/17	9 -										-
9.GDT 5/1	10-										10-
VTE 010509	11 -	-									-
O TEMPL/	12 -	_									-
TEC ENVIR	13 -										-
PJ STAN	14 -	<u> </u>									-
ORINGS.G	15-										15-
15 SOIL BO	16 -	-									
REEN AO	17 -	-									-
4 - EVERG	18 -										-
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17	19 -	-									-
Э Е											

PROJECT: Marcus Hook Industrial Complex

LOCATION: **AOI 5 Characterization** PROJECT NUMBER: **213402567**

DRILLING: STARTED 6/8/16 COMPLETED: 6/8/16

COMPLETED:

INSTALLATION: STARTED DRILLING COMPANY: **Sweeney**

DRILLING EQUIPMENT: Backhoe Bucket

DRILLING METHOD:

SAMPLING EQUIPMENT: Backhoe Bucket

WELL / PROBEHOLE / BOREHOLE NO:

PAGE 1 OF 1 **AOI5-BH-16-050**

*NORTHING (ft): **184670.8***GROUND ELEV (ft): **NA**INITIAL DTW (ft): **6**

STATIC DTW (ft): **Not Measured**WELL CASING DIAMETER (in): **NA**WELL CASING DIAMETER (in): **NA**

LOGGED BY: **D. Downing**

*EASTING (ft): 2622645.21

*TOC ELEV (ft): NA

BOREHOLE DEPTH (ft): 6

WELL DEPTH (ft): NA

Stantec

BOREHOLE DIAMETER (in): N. CHECKED BY: A. Patel

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Į	SAMPLING	<u> EQU</u>	IPME	NT: Backhoe Bucket	*COORDINATE SYSTEM AND DA	TUMS: F	PA STATE PLANE	SOUTH, I	NAD83; N	IAVD 88	
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
				FILL; brown fine SAND and grey SILT, little cinde	rs, damp		-			6.8	
	1 -		ML	grey SILT, damp, soft			AOI5-BH-16 -050-1-2			223.2	
	2 -		SP- SM	dark grey SILT and fine SAND, some medium gra	evel, damp/moist		AOI5-BH-16 -050-2-4			242.4	-
	4 -		ML- SM	dark grey SILT, some fine sand, some medium g	ravel, damp/moist						-
	5-						-			129.1	5-
	6 -			End of boring at 6 ft bgs							<u> </u>
	7 -	_									-
	8 -										_
2/10/1/	9 -	-									40
വാ.ഒററ	10 <i>-</i> -										10-
INITEALE	12 -										
	13 -	_									-
	14 -	_									-
0.00	15-	_									15-
SOIL DOIL	16 -	_									
KEEN AOIS	17 -	_									
י- בעבוקטו	18 -										
GEO FORM 304 - EVERGREEN AUIS SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17	19 -	_									

PROJECT: Marcus Hook Industrial Complex

LOCATION: AOI 5 Characterization PROJECT NUMBER: **213402567**

DRILLING: STARTED 6/8/16 COMPLETED: **6/8/16**

COMPLETED:

INSTALLATION: STARTED DRILLING COMPANY: **Sweeney**

DRILLING EQUIPMENT: Backhoe Bucket

DRILLING METHOD:

SAMPLING FOLIPMENT: Backhoe Bucket

WELL / PROBEHOLE / BOREHOLE NO:

AOI5-BH-16-051 PAGE 1 OF 1

*NORTHING (ft): 184780.49 *GROUND ELEV (ft): **NA** INITIAL DTW (ft): 5

STATIC DTW (ft): Not Measured WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA

LOGGED BY: **D. Downing**

*EASTING (ft): 2622670.89 *TOC ELEV (ft): **NA** BOREHOLE DEPTH (ft): 5 WELL DEPTH (ft): **NA**

Stantec

CHECKED BY: A. Patel

L	SAMPLING	EQU	IPMEN	NT: Backhoe Bucket	*COORDINATE SYSTEM AND DA	TUMS: F	PA STATE PLANE				
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
ŀ			ML	grey to dark grey SILT, slight brown staining, dry						_	
	1 -						AOI5-BH-16 -051-0-2			156.1	-
	2 -			damp at 2 ft							-
	3 -						-			260.5	_
	4 -		SP- SM	grey to dark grey SILT and fine SAND, wet			AOI5-BH-16 -051-4-5			321.7	_
	5-			End of boring at 5 ft bgs			001-4-0				<u>⊽</u> 5−
	6 -										_
	7 -										_
	8 -										
	9 -										_
5	10-										10-
1000	11 -										_
ו בואו בא	12 -										
וֹיִגְינִייִ וֹיִגְינִייִּ	13 -										
	14 -										
2 SONING C	15—										15-
D SUIL EV	16 -										
ZEEN AU	17 -										
- EVERG	18 -										
GEO FORM 304 - EVERGREEN AGIS SOIL BORINGS, GPJ STANTEC ENVIRO TEMPLATE 010509, GD T 5/10/17	19 -										

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-052 PROJECT NUMBER: **213402567** *EASTING (ft): 2622538.43 *NORTHING (ft): 184756.12 STARTED 6/8/16 COMPLETED: **6/8/16** DRILLING: *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 1 DRILLING COMPANY: Sweeney STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: **D. Downing** CHECKED BY: A. Patel

L	SAMPLING	S EQU	IPME		*COORDINATE SYSTEM AND DAT			SOUTH, I			
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
			ML	brown SILT with some clay, wet (likely rain)			AOI5-BH-16 -052-0-1			1.1	
	1 -			End of Boring at 1 ft bgs							-
	2 -										-
	3 -										-
	4 -										-
	5-										5-
	6 -										-
	7 -										-
	8 -										-
	9 -										=
5/10/17	10-										10-
0509.GDT											10
PLATE 01	11 -										Ī
IRO TEMF	12 -										1
TEC ENV	13 -										-
PJ STAN	14 -										-
DRINGS.G	15-										15-
GEO FORM 304 - EVERGREEN AOI5 SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17	16 -										-
EEN AOI	17 -										-
- EVERGR	18 -										-
JRM 304 -	19 -										-
GEO FC											

PROJECT: Marcus Hook Industrial Complex

LOCATION: AOI 5 Characterization PROJECT NUMBER: **213402567**

STARTED 6/8/16 COMPLETED: **6/8/16**

COMPLETED:

DRILLING COMPANY: **Sweeney**

INSTALLATION: STARTED

DRILLING EQUIPMENT: Backhoe Bucket

DRILLING METHOD:

DRILLING:

WELL / PROBEHOLE / BOREHOLE NO:

AOI5-BH-16-053 PAGE 1 OF 1

*NORTHING (ft): 184778.57 *GROUND ELEV (ft): **NA** INITIAL DTW (ft): 5

STATIC DTW (ft): Not Measured WELL CASING DIAMETER (in): NA

LOGGED BY: **D. Downing**

*EASTING (ft): 2622541.31 *TOC ELEV (ft): **NA** BOREHOLE DEPTH (ft): 6 WELL DEPTH (ft): **NA**

BOREHOLE DIAMETER (in): **NA** CHECKED BY: A. Patel

Stantec

SAMPLING	EQU	IPME	NT: Backhoe Bucket	*COORDINATE SYSTEM AND DATUMS:		SOUTH, I			
Depth (feet)	Graphic Log	nscs	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1 -		SP- SM	grey SILT and fine SAND, damp		AOI5-BH-16 -053-0-2			53.6	_
3 -		SP	grey fine SAND, some silt, damp		-			184.3	-
4 - 5-		SW	grey medium to fine SAND, little silt, trace mediu dioxide = 0.3 ppm]	m gravel, wet [Sulfur	AOI5-BH-16 -053-4-5			419.8	- <u>∨</u> 5-
6 -			End of boring at 6 ft bgs						-
8 -									-
10-									10-
12 -									-
13 -									-
14 - 15-									15-
16 -									-
17 - 18 -									-
10 — 11 - 12 - 13 - 14 - 15 — 16 - 17 - 18 -									-

PROJECT: Marcus Hook Industrial Complex **LOCATION: AOI 5 Characterization**

PROJECT NUMBER: **213402567** COMPLETED: **6/8/16**

STARTED 6/8/16 DRILLING: INSTALLATION: STARTED

COMPLETED:

DRILLING COMPANY: **Sweeney** DRILLING EQUIPMENT: Backhoe Bucket

DRILLING METHOD:

WELL / PROBEHOLE / BOREHOLE NO:

AOI5-BH-16-054 PAGE 1 OF 1

*NORTHING (ft): 184730.91 *GROUND ELEV (ft): **NA** INITIAL DTW (ft): 4

STATIC DTW (ft): Not Measured WELL CASING DIAMETER (in): NA

LOGGED BY: **D. Downing**

*EASTING (ft): 2622566.57 *TOC ELEV (ft): **NA** BOREHOLE DEPTH (ft): 5 WELL DEPTH (ft): **NA**

BOREHOLE DIAMETER (in): **NA** CHECKED BY: A. Patel

Stantec

Second S	SAMPLING	G EQU	IPME		ORDINATE SYSTEM AND DATUMS:		SOUTH, N	IAD83; N	AVD 88	
FILL; top soil ML grey SiLT, damp [Sulfur dioxide = 1.9 ppm] 2 - [Sulfur dioxide = 2.1 ppm] 3 - [Sulfur dioxide = 2.1 ppm] AOIS-BH-16 -054-0-2 587 - AOIS-BH-16 -054-2-4 574.9 - 223.9 End of boring at 5 ft bgs 6 - 7 - 8 - 9	Depth (feet)	Graphic Log	nscs	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1 - ML grey SILT, damp [Sulfur dioxide = 1.9 ppm] 2 - [Sulfur dioxide = 2.1 ppm] 3 - [Sulfur dioxide = 2.1 ppm] 4 - SILT SP- SM dark grey SILT and grey to white coarse SAND, black staining, hard, wet SND sM solution in the staining state of the				FILL; top soil					_	
AOI5-BH-16 -054-2-4 574.9 - 4 SP dark grey SILT and grey to white coarse SAND, black staining, hard, wet 5 ft bgs 5 - 8 - 9 -	1			grey SILT, damp [Sulfur dioxide = 1.9 ppm]		AOI5-BH-16 -054-0-2			587	-
4 SP-SM dark grey SILT and grey to white coarse SAND, black staining, hard, wet 5 End of boring at 5 ft bgs 6 - 7 - 8 - 9 -	2			[Sulfur dioxide = 2.1 ppm]						_
SP-SM dark grey SILT and grey to white coarse SAND, black staining, hard, wet End of boring at 5 ft bgs 7 - 8 - 9 -						AOI5-BH-16 -054-2-4				✓ -
6 - 7 - 8 - 9 -			SP- SM		k staining, hard, wet	-			223.9	5-
8 - 9 -	6	-		Lite of boiling at o it bys						-
	7	-								
	8									
10- 11 - 12 - 13 - 14 - 15- 16 - 17 - 18 - 19 -										-
12 - 13 - 14 - 15 - 16 - 17 - 18 - 19 -	10-									10-
13 - 14 - 15 - 16 - 17 - 18 - 19 -	12	_								-
14 - 15- 16 - 17 - 18 - 19 -	13	_								-
15- 16 - 17 - 18 - 19 -	14									
16 - 17 - 18 - 19 -	15-									15-
18 -	16									
19 -	18	_								-
	19	-								-

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec** LOCATION: AOI 5 Characterization AOI5-BH-16-055 PAGE 1 OF 1 PROJECT NUMBER: **213402567** *EASTING (ft): 2623163.05 *NORTHING (ft): 183666.15 STARTED 6/9/16 COMPLETED: **6/9/16** DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 2 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: **D. Downing** CHECKED BY: A. Patel

SAMP	LING	EQU	IPME	NT: Backhoe Bucket	*COORDINATE SYSTEM AND DATUMS:		SOUTH,			
Depth (feet)	(1551)	Graphic Log	nscs	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
	1 -			dark grey to brown silt and fine sand, cinders, st	aining, dry	AOI5-BH-16 -055-0-2			129.3	-
	3 -			End of boring at 2 ft bgs						-
	4 - 5-									5-
	6 -									-
	8 -									-
01/6 U25.800.010	10 <i>-</i>									10-
NVIKO LEMPLATE	12 - 13 -									-
	14 -									-
DOUL DONING	15— 16 -									15 <i>-</i> -
AG K	17 - 18 -									-
GEO FORM 304	19 -									-

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-056 PROJECT NUMBER: **213402567** *EASTING (ft): 2623218.11 *NORTHING (ft): 183601.59 STARTED 6/7/16 COMPLETED: 6/7/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 4.5 DRILLING COMPANY: Sweeney STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: **D. Downing** CHECKED BY: A. Patel

	SAMPLING	3 EQU	PMEI		COORDINATE SYSTEM AND DATE	_		SOUTH, I			
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
	1 -			FILL; dark brown silt and medium to fine sand, cind dry tar-like product observed at 2 ft [Hydrogen sulfide =			AOI5-BH-16 -056-0-2			108.8	-
	3 -			tar-like product observed at 2 ft [Hydrogen sulfide = dioxide = 1.2 ppm]			AOI5-BH-16 -056-2-4			6.8	-
	7			End of boring at 4.5 ft bgs			-			4.2	
	5-										5-
	6 -										_
	7 -										-
	8 -										-
17	9 -										-
GDT 5/10,	10-										10-
TE 010509.	11 ·										-
TEMPLA	12 ·	-									_
EC ENVIRC	13 -	-									=
J STANTE	14 -	-									=
RINGS.GF	15-										15-
5 SOIL BC	16 ·	-									-
REEN AOI	17	-									-
EVERGI	18 -	-									=
GEO FORM 304 - EVERGREEN AOI5 SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17	19 -										_
GEC											

PROJECT: Marcus Hook Industrial Complex

LOCATION: AOI 5 Characterization PROJECT NUMBER: **213402567**

STARTED 6/7/16 COMPLETED: 6/7/16 DRILLING:

COMPLETED:

DRILLING COMPANY: **Sweeney**

INSTALLATION: STARTED

DRILLING EQUIPMENT: Backhoe Bucket

DRILLING METHOD:

WELL / PROBEHOLE / BOREHOLE NO:

PAGE 1 OF 1 AOI5-BH-16-057

*NORTHING (ft): 184258.64 *GROUND ELEV (ft): **NA** INITIAL DTW (ft): 5

STATIC DTW (ft): Not Measured WELL CASING DIAMETER (in): NA

LOGGED BY: **D. Downing**

*EASTING (ft): 2622065.47 *TOC ELEV (ft): **NA** BOREHOLE DEPTH (ft): 8 WELL DEPTH (ft): **NA**

BOREHOLE DIAMETER (in): NA CHECKED BY: A. Patel

Stantec

SAMPLING	S EQU	IPMEN		COORDINATE SYSTEM AND DATUMS	S: PA		SOUTH, I			
Depth (feet)	Graphic Log	nscs	Description	Sample		Sample ID	Measured Recov. (feet)	Blow Count	Headspace NPID MPID MPID MPID MPID MPID MPID MPID M	Depth (feet)
1 -			FILL; brown to dark brown silt, wood, wet (surface	water)		AOI5-BH-16 -057-0-2			0	-
2 -		ML	grey to dark grey SILT, wet (surface water)			-			0	-
3 -	888888	CL-	grey blue CLAY and grey SILT; wet (surface water			-			0	
5-		ML								<u>⊽</u> 5−
6 -		CL	grey blue CLAY, transition to crumbly white to yellot to fine sand at 7 ft, tight, dry, possibly saturated at	ow clay, with medium 5 ft						
8 -			End of boring at 8 ft bgs			AOI5-BH-16 -057-7-8			0.8	
9 -										-
10 - 11 -										10-
12 -	_									_
13 -	-									
14 - 15 -	_									15-
16 -										-
10 - 11 - 12 - 12 - 12 - 12 - 12 - 12 -	.									
18 -										

GEO FORM 304 - EVERGREEN AOI5 SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17

PROJECT: Marcus Hook Industrial Complex LOCATION: AOI 5 Characterization PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:

AOI5-BH-16-058

Stantec

STARTED 6/7/16 DRILLING:

DRILLING COMPANY: **Sweeney**

DRILLING METHOD:

COMPLETED: **6/7/16** INSTALLATION: STARTED

*NORTHING (ft): 184111.05 *GROUND ELEV (ft): **NA** COMPLETED:

INITIAL DTW (ft): 8

PAGE 1 OF 1

STATIC DTW (ft): Not Measured WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA LOGGED BY: **D. Downing**

*EASTING (ft): 2622021.78 *TOC ELEV (ft): **NA** BOREHOLE DEPTH (ft): 8 WELL DEPTH (ft): **NA**

CHECKED BY: A. Patel *COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

SAMPLING EQUIPMENT: Backhoe Bucket

DRILLING EQUIPMENT: Backhoe Bucket

L	SAMPLING	EQU	IPIVIEI	N I : BACKNOE BUCKET *COORDINATE SYSTEM AND DA	ATUMS:	PA STATE PLANE	SOUTH, I	NAD83; N	IAVD 88	
	Depth (feet)	Graphic Log	nscs	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace Name (ppm)	Depth (feet)
	1 -		ML	SILT, grey to dark grey to brown, moist, trace to some fine sand from 2 to 8 ft, wet at 8 ft		AOI5-BH-16 -058-0-2			29.5	_
	2 -									-
	3 -					AOI5-BH-16 -058-3-4			34.3	-
	4 -									-
	5—					-			16.3	5-
	6 -									-
	7 -					-			0.8	_
	8 -			End of boring at 8 ft bgs						☑ _
2/10/1/	9 -									_
1509.GDT	10-									10-
PLA IE 010	11 -									
NIKO IEM	12 -									
AN I EC EN	13 <i>-</i> 14 <i>-</i>									
S.GPJ SI	15-									15-
IL BURING	16 -									13-
N AOIS SC	17 -									
VERGREE	18 -									
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS: GPJ STANTEC ENVIRO TEMPLATE 010509; GDT 5/10/17	19 -									
GEO FO										

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: Stantec **LOCATION: AOI 5 Characterization** AOI5-BH-16-059 PAGE 1 OF 1 PROJECT NUMBER: **213402567** *EASTING (ft): 2621955.58 *NORTHING (ft): 184136.85 DRILLING: STARTED **6/7/16** COMPLETED: 6/7/16 *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 10 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: **D. Downing** CHECKED BY: A. Patel

SAMPLIN	IG EQU	IPMEI	NT: Backhoe Bucket	*COORDINATE SYSTEM AND DA			SOUTH, I	NAD83; N	AVD 88	
Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1 2	-		FILL; brown to light brown silt, bricks, gravel, cind	lers, damp		AOI5-BH-16 -059-0-2			0	-
3	-					-			0	-
5		MI	light heavy to grov CII Topoigh			-			0	5-
7		ML	light brown to grey SILT, moist			-			6.9	
9						AOI5-BH-16 -059-8-10			12	-
10			End of boring at 10 ft bgs							10-
12	_									_
13										-
14										_
15										15-
17										-
18										
10. 11. 12. 13. 14. 15. 15. 16. 17. 17. 17. 17. 17. 17. 17. 17. 17. 17										_

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: Stantec **LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-060 PROJECT NUMBER: **213402567** *EASTING (ft): 2621878.33 *NORTHING (ft): **184137.02** STARTED 6/7/16 COMPLETED: 6/7/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 10 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: **D. Downing** CHECKED BY: A. Patel

	DRILLING			NT: Backhoe Bucket	LOGGED BY: D. Down i			CKED B			
F	SAMPLING	EQU	IPIVIEI	1: Backiloe Bucket	*COORDINATE SYSTEM AND DA	TUMS: I		SOUTH, N	NAD83; N	AVD 88	
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID PID (bpm)	Depth (feet)
r			ML	grey brown SILT, dry							
	1 -						AOI5-BH-16 -060-0-2			1.3	_
l	2 -		ML	dark brown to grey SILT, trace fine sand from 2 to	o 4 ft and 6 to 8 ft						-
				damp							
	3 -						-			170	-
	4 -										-
	5-						-			476.2	5-
	6 -										_
	7 -						-			55.6	_
	8 -		SP	brown to dark brown fine SAND, some silt, moist							_
	9 -						AOI5-BH-16 -060-8-10			484.5	_
	10-			End of boring at 10 ft bgs							10-
	11 -										_
	12 -										-
	13 -										-
	14 -										-
	15—										15-
	16 -										_
	17 -										-
	18 -										_
	19 -										

PROJECT: Marcus Hook Industrial Complex

LOCATION: AOI 5 Characterization PROJECT NUMBER: **213402567**

STARTED 6/7/16 COMPLETED: 6/7/16 INSTALLATION: STARTED COMPLETED:

DRILLING COMPANY: **Sweeney**

DRILLING EQUIPMENT: Backhoe Bucket

DRILLING METHOD:

DRILLING:

SAMPLING EQUIPMENT: Backhoe Bucket

WELL / PROBEHOLE / BOREHOLE NO:

AOI5-BH-16-061 PAGE 1 OF 1

*NORTHING (ft): 184047.29 *GROUND ELEV (ft): **NA** INITIAL DTW (ft): 10

STATIC DTW (ft): Not Measured WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA

LOGGED BY: **D. Downing**

*EASTING (ft): 2621865.93 *TOC ELEV (ft): **NA** BOREHOLE DEPTH (ft): 11 WELL DEPTH (ft): **NA**

Stantec

CHECKED BY: A. Patel *COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

	Depth (feet)	Graphic Log	nscs	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
	1 -		ML	red brown to brown SILT, trace to little fine sand from 6 to 9 ft, dry		AOI5-BH-16 -061-0-2			0	-
	2 -					-			0	
	4 - 5					-			0	5-
	6 -					-			0	- - -
1/	8 -		SP	grey fine SAND, some to little silt, moist		-			0	-
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT \$/10/17	10 <i>-</i> -			End of boring at 11 ft bgs		- AOI5-BH-16 -061-10-11			3.7	¥ 10− -
NVIRO LEMPLATE	12 - 13 -									
S.GPJ SIANIECE	14 -									-
IS SUIL BURING	15 <i>-</i> -									15-
- EVEKGKEEN AC	17 - 18 -									-
GEO FORM 304 -	19 -									_

PROJECT: Marcus Hook Industrial Complex
LOCATION: AOI 5 Characterization
PROJECT NUMBER: 213402567

DRILLING: STARTED 6/6/16 COMPLETED: 6/6/16

WELL / PROBEHOLE / BOREHOLE NO:
PAGE 1 OF 1 AOI5-BH-16-062
**NORTHING (ft): 183778.09 **EASTI

INSTALLATION: STARTED COMPLETED:

DRILLING COMPANY: Sweeney

DRILLING EQUIPMENT: Backhoe Bucket

*GROUND ELEV (ft): NA
INITIAL DTW (ft): 4
STATIC DTW (ft): Not Measured
WELL CASING DIAMETER (fp): NI

DRILLING METHOD:

SAMPLING FOUIPMENT: Backhoe Bucket

*COORDINATE SYSTEM AND DATUMS:

*EASTING (ft): 2621901.35

*TOC ELEV (ft): NA

BOREHOLE DEPTH (ft): 8

WELL DEPTH (ft): NA

Stantec

WELL CASING DIAMETER (in): NA
LOGGED BY: D. Downing
CHECKED BY: A. Patel

*COORDINATE SYSTEM AND DATIMS: PA STATE PLANE SOLITH NADR3: NAVD 88

SAMPLING	EQUI	PME	NT: Backhoe Bucket	COORDINATE SYSTEM AND DATU	MS: P	A STATE PLANE	SOUTH, N	NAD83; N	IAVD 88	
Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID PID (bpm)	Depth (feet)
1 -			FILL; dark grey silt and fine sand, trace of brown of damp	oloring, trace cinders,		AOI5-BH-16 -062-0-2			67	-
3 -		ML- CL	grey to brown SILT, little to some clay from 4 to 8	ft, damp		-			0.3	-
4 -			wet (possibly perched)							<u> </u>
5-						-			1.3	5-
6 - 7 -			staining at 7 ft			-			2.2	-
8 -			End of boring at 8 ft bgs			AOI5-BH-16 -062-7-8			7.5	-
9 -										-
10 — 11 - 12 - 13 - 13 - 13 - 13 - 13 - 13 -										10-
12 -										-
-1										-
14 - 15- 15-										15-
										-
90 P										-
14 - 15 - 16 - 17 - 17 - 18 - 17 - 18 - 17 - 18 - 17 - 18 - 18										-

GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17

PROJECT: Marcus Hook Industrial Complex **LOCATION: AOI 5 Characterization** PROJECT NUMBER: **213402567**

WELL / PROBEHOLE / BOREHOLE NO:

AOI5-BH-16-063 PAGE 1 OF 1

Stantec

STARTED 6/6/16 DRILLING:

COMPLETED: **6/6/16** INSTALLATION: STARTED COMPLETED:

DRILLING COMPANY: **Sweeney**

DRILLING EQUIPMENT: Backhoe Bucket

DRILLING METHOD:

*NORTHING (ft): 183798.17 *GROUND ELEV (ft): **NA**

INITIAL DTW (ft): 9 STATIC DTW (ft): Not Measured WELL CASING DIAMETER (in): NA

LOGGED BY: **D. Downing**

*EASTING (ft): 2621809.85 *TOC ELEV (ft): **NA** BOREHOLE DEPTH (ft): 9 WELL DEPTH (ft): **NA** BOREHOLE DIAMETER (in): **NA**

CHECKED BY: A. Patel

SAMPLING	EQU	IPMEN	NT: Backhoe Bucket	*COORDINATE SYSTEM AND DATE			SOUTH, I			
Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (DD)	Depth (feet)
1 -		SP- SM	dark grey SILT and fine SAND, some black medi	um gravel, moist		AOI5-BH-16 -063-0-2			21.4	-
3 -		ML- CL	brown SILT, some clay, slight staining, damp			-			89.1	-
5-		0.0				-			112.2	5-
7 -		SP- SM	brown fine SAND and SILT, moist			AOI5-BH-16 -063-6-8			303.8	-
9 -		SP	brown fine SAND, some dark brown silt, moist End of boring at 9 ft bgs			-			113	<u>-</u> <u>▼</u> -
10-			End of boiling at 0 it ago							10-
11 -										_
12 -										-
14 -										-
15 —										15-
16 -										-
18 -										-
10 11 - 12 - 13 14 - 15 - 15 - 15 - 15 - 15 - 15 - 1										_

PROJECT: Marcus Hook Industrial Complex
LOCATION: AOI 5 Characterization
PROJECT NUMBER: 213402567

DRILLING: STARTED 6/6/16 COMPLETED: 6/6/16
INSTALLATION: STARTED COMPLETED: WELL / PROBEHOLE / BOREHOLE NO:
PAGE 1 OF 1 AOI5-BH-16-064

**NORTHING (ft): 183691.9
**GROUND ELEV (ft): NA
**TOC ELEV (ft): NA

DRILLING COMPANY: **Sweeney**DRILLING EQUIPMENT: **Backhoe Bucket**

DRILLING EQUIPMENT. DACKITOE BUCKE

DRILLING METHOD:

SAMPLING EQUIPMENT: Backhoe Bucket

*NORTHING (ft): 183691.9
*GROUND ELEV (ft): NA

INITIAL DTW (ft): Not Encountered
STATIC DTW (ft): Not Measured
WELL CASING DIAMETER (in): NA
LOGGED BY: D. Downing

*EASTING (ft): 2621816.34
*TOC ELEV (ft): NA
BOREHOLE DEPTH (ft): 10
WELL DEPTH (ft): NA
BOREHOLE DIAMETER (in): NA
CHECKED BY: A. Patel

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

Ŀ	SAMPLING	EQUI	PIVIEI	N I : BACKNOE BUCKET *COORDINATE SYSTEM AND DA	ATUMS:	PA STATE PLANE	SOUTH,			
	Depth (feet)	Graphic Log	nscs	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
	1 -		CL- ML	brown SILT and CLAY, damp		AOI5-BH-16 -064-0-2			0	-
	2 -		ML	light grey to brown to red-brown SILT, damp, black staining at 8 ft		-			2.8	-
	4 -									-
	5 <i>-</i> -					-			20.6	5-
	7 -					-			264.1	-
17	8 - 9 -					AOI5-BH-16 -064-8-10			580.8	-
9.GDT 5/10/1	10-			End of boring at 10 ft bgs						10-
IPLATE 01050	11 - 12 -									_
C ENVIRO TEN	13 -									
3PJ STANTE	14 -									-
L BORINGS.	15-									15-
EEN AOI5 SOI	16 - 17 -									
04 - EVERGRE	18 -									-
GEO FORM 304 - EVERGREEN AOI5 SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17	19 -									_

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-065 PROJECT NUMBER: **213402567** *NORTHING (ft): 182798.89 *EASTING (ft): 2622116.42 STARTED 6/16/16 COMPLETED: 6/16/16 DRILLING: *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 6 DRILLING COMPANY: Sweeney STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA

LOGGED BY: **D. Downing**

CHECKED BY: A. Patel

DRILLING METHOD:

SAMPLING EQUIPMENT: Backhoe Bucket *COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88 Sample Graphic Log **USCS** Blow Count Depth (feet) Description Sample ID SP brown fine SAND, little silt, damp Encountered concrete slab at 2 ft AOI5-BH-16 0 1 -065-0-2 2 ML dark grey SILT, firm, some brown fine sand, dry 0 3 0 FILL; brown fine sand, bricks, cinders, glass, black staining, dry AOI5-BH-16 Encountered concrete slab at 6 ft 0 -065-4-5 5 3.5 6 End of boring at 6 ft bgs 7 8 9 10 10-11 12 13 14 15 15 16 17 18 19

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-066 PROJECT NUMBER: **213402567** *EASTING (ft): 2620493.46 STARTED 6/6/16 *NORTHING (ft): 183021.11 COMPLETED: **6/6/16** DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 8 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: **D. Downing** CHECKED BY: A. Patel

	SAMPLING			NT: Backhoe Bucket	*COORDINATE SYSTEM AND DAT			SOUTH, I		
	Depth (feet)	Graphic Log		Description		Sample		Measured Recov. (feet)	Headspace PID (ppm)	Depth (feet)
	1 -		ML	grey SILT, little brown fine sand, possible staining	g, dry		AOI5-BH-16 -066-0-2		15.8	-
	2 -		SP- SM	grey SILT and fine SAND, wet (surface water)			-		9.3	-
	4 - 5-	- 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	SW	grey medium to fine SAND, some silt, wet (surface	ce water)		-		36.5	5-
	6 - 7 -		SW- SM	grey SILT and brown medium to fine SAND, black	k staining, moist		AOI5-BH-16 -066-6-8		64.5	-
17	8 -			End of boring at 8 ft bgs						-
509.GDT 5/10/	10-									10-
TEMPLATE 010	11 - 12 -									-
ANTEC ENVIRO	13 -	_								-
RINGS.GPJ ST	14 - 15-									15-
AOI5 SOIL BOI	16 -									-
GEO FORM 304 - EVERGREEN AOI5 SOIL BORINGS GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17	17 <i>-</i> 18 -									
GEO FORM 302	19 -									_

PROJECT: Marcus Hook Industrial Complex **LOCATION: AOI 5 Characterization**

PROJECT NUMBER: **213402567**

STARTED 6/6/16 COMPLETED: **6/6/16** DRILLING: INSTALLATION: STARTED COMPLETED:

DRILLING COMPANY: **Sweeney**

DRILLING EQUIPMENT: Backhoe Bucket

DRILLING METHOD:

WELL / PROBEHOLE / BOREHOLE NO:

PAGE 1 OF 1 AOI5-BH-16-067

*NORTHING (ft): 182974.76 *GROUND ELEV (ft): **NA** INITIAL DTW (ft): 9.5

STATIC DTW (ft): Not Measured WELL CASING DIAMETER (in): NA

LOGGED BY: **D. Downing**

*EASTING (ft): 2620476.91 *TOC ELEV (ft): **NA** BOREHOLE DEPTH (ft): 10 WELL DEPTH (ft): **NA**

BOREHOLE DIAMETER (in): NA CHECKED BY: A. Patel

Stantec

SAMPLING	EQUI	PMEN	NT: Backhoe Bucket	*COORDINATE SYSTEM AND DATU			SOUTH, I	14 000 1	141 /D 00	
Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (bpm)	Depth (feet)
1 -		ML	dark brown to brown SILT, some medium to fine staining, slightly damp	sand, some black		AOI5-BH-16 -067-0-2			2.3	-
2 -										-
3 -						-			94.8	_
5-						-			56.3	5-
6 -		SP	dark grey medium sand, little silt, moist							-
7 -						-			29	
8 -		SW	dark grey to brown, medium to fine SAND, some slightly stained, damp	silt, little clay, clay is		AOI5-BH-16 -067-8-10			124.8	_
10-	*****		wet at 9.5 ft End of boring at 10 ft bgs							<u>⊽</u> 10−
11 -										_
12 - 13 -										
14 -										-
15-										15-
16 - 17 -										-
18 -										_
10 — 11 - 12 - 13 - 14 - 15 — 16 - 17 - 18 -										=

GEO FORM 304 - EVERGREEN AOI5 SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-068 PROJECT NUMBER: **213402567** *NORTHING (ft): 182950.9 STARTED 6/6/16 COMPLETED: **6/6/16** DRILLING:

COMPLETED:

*GROUND ELEV (ft): **NA** INITIAL DTW (ft): 8 STATIC DTW (ft): Not Measured WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA

LOGGED BY: **D. Downing**

*EASTING (ft): 2620517.61 *TOC ELEV (ft): NA BOREHOLE DEPTH (ft): 8 WELL DEPTH (ft): **NA**

Stantec

CHECKED BY: A. Patel *COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

DRILLING METHOD: SAMPLING EQUIPMENT: Backhoe Bucket

DRILLING EQUIPMENT: Backhoe Bucket

INSTALLATION: STARTED

DRILLING COMPANY: Sweeney

SAIVI	PLING	EQUI	PIVIE	N I : BACKNOE BUCKET *COORDINATE SYSTEM AND DA	ATUMS	PA STATE PLANE	SOUTH,			
Depth	(feet)	Graphic Log	nscs	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
			SP- SM	brown to dark grey fine SAND and SILT, moist						
	1 -					AOI5-BH-16 -068-0-2			31.5	-
	2 -									-
	3 -					-			24.6	_
	4 -			black staining of silt at 4 ft						-
	5-					-			18.9	5-
	6 -		SW	brown to dark grey, medium to fine SAND, some silt, moist						-
	7 -					AOI5-BH-16 -068-6-8			39.9	_
	8 -	*****		End of boring at 8 ft bgs						
	9 -									-
105.	10-									10-
80000	11 -									-
E MILL	12 -									=
ECENTRIC	13 -									_
NA IO	14 -									_
	15-									15-
Ola SOIL B	16 -									-
SKEEN A	17 -									_
- E VER	18 -									_
GEO FORMI 304 - EVERGREEN AUG SOIL BORINGS, GFJ STANTEC ENVIRO TEMPLATE UT0509, GDT STOTT	19 -									_
5										

GEO FORM 304 - EVERGREEN AOI5 SOIL BORINGS GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-069 PROJECT NUMBER: **213402567** *NORTHING (ft): **182244.24** *EASTING (ft): **2621330.92** STARTED 6/10/16 COMPLETED: 6/10/16 DRILLING: *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 8 BOREHOLE DEPTH (ft): 10 DRILLING COMPANY: Sweeney STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA DRILLING EQUIPMENT: Backhoe Bucket

DRILLING METHOD:

SAMPLING EQUIPMENT: Backhoe Bucket

WELL CASING DIAMETER (in): NA

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

LOGGED BY: **D. Downing**

BOREHOLE DIAMETER (in): NA

CHECKED BY: A. Patel

Sample Graphic Log **USCS** Blow Count Depth (feet) Description Sample ID FILL; brown to dark grey silt, little fine sand, brick fragments, damp AOI5-BH-16 0 -069-0-2 2 ML brown to dark grey SILT, little clay from 4 to 6 ft, moist 3 2.7 4 5-4.8 5 6 0 7 8 grey CLAY, some silt, wet AOI5-BH-16 9 6.1 -069-8-10 GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17 10 10 End of boring at 10 ft bgs 11 12 13 14 15 15 16 17 18 19

PROJECT: Marcus Hook Industrial Complex

LOCATION: AOI 5 Characterization PROJECT NUMBER: **213402567**

STARTED 6/10/16 COMPLETED: 6/10/16 DRILLING: INSTALLATION: STARTED COMPLETED:

DRILLING COMPANY: Sweeney

DRILLING EQUIPMENT: Backhoe Bucket

DRILLING METHOD:

SAMPLING EQUIPMENT: Backhoe Bucket

WELL / PROBEHOLE / BOREHOLE NO:

PAGE 1 OF 1 AOI5-BH-16-070

*NORTHING (ft): 182096.7 *GROUND ELEV (ft): **NA** INITIAL DTW (ft): 2

STATIC DTW (ft): Not Measured

LOGGED BY: **D. Downing**

*EASTING (ft): 2621416.54 *TOC ELEV (ft): NA BOREHOLE DEPTH (ft): 4 WELL DEPTH (ft): **NA**

Stantec

WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA CHECKED BY: A. Patel

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88

L	O/ 11/11 E11 10		·· ···-	11. Dackfloe Ducket COORDINATE SYSTEM AND DA	ti Oivio. i	// OI//IET DUIL	000111,1	W (DOO, 1		
	Depth (feet)	Graphic Log	nscs	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (mg/)	Depth (feet)
	1 -		SP- SM	brown fine SAND and dark brown SILT, damp		AOI5-BH-16 -070-0-2			0.5	-
	2 -			wet at 2 ft						҆
	3 -					AOI5-BH-16 -070-2-4			3.6	-
	4 -			End of boring at 4 ft bgs						-
	5-									5-
	6 -									-
	7 -									-
	8 -									-
/ L/0L/c	9 -									_
1208.GD	10 —									10-
PLAIE 010	11 -									-
NVIRO TEM	12 - 13 -									
ECE	13									
JPJ SIAN	14 -									-
BORINGS.C	15-									15-
AOIS SOIL I	16 -									-
RGREEN A	17 -									-
304 - EVER	18 -									-
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17	19 -									
_										

GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS. GPJ STANTEC ENVIRO TEMPLATE 010509, GDT 5/10/17

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-071 PROJECT NUMBER: **213402567** *NORTHING (ft): 182283.99 *EASTING (ft): 2621412.88 STARTED 6/10/16 COMPLETED: 6/10/16 DRILLING: *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 2 BOREHOLE DEPTH (ft): 6 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: **D. Downing** CHECKED BY: A. Patel

Depth (feet)		NT: Backhoe Bucket Description	*COORDINATE SYSTEM AND DATE	Sample	Sample ID	ov.	NAD83; N	Headspace	ŧ÷
1 -	nscs			ımple	Sample ID	ov. et)	w rut	pace D m)	÷÷
		EU 1 1 20 C 1 1		Ss	Campic 12	Meas Rec (fe	Sou	Heads PII (ppl	Depth (feet)
		FILL; dark grey silt, some fine sand, damp							
2	S				AOI5-BH-16 -071-0-2			9.1	
	ML	dark grey to brown SILT, damp							
3 -					AOI5-BH-16 -071-2-4			64.3	
4 -									
5-					-			0	5-
6									
7 -		End of boring at 6 ft bgs							
8 -									
9 -									
10									10-
11 -									
12 -									
13 -									
14 -									
15-									15 ⁻
16 -									
17 -									
18 -									
19 -									

PROJECT: Marcus Hook Industrial Complex LOCATION: AOI 5 Characterization

PROJECT NUMBER: **213402567**

STARTED 6/10/16 DRILLING:

INSTALLATION: STARTED DRILLING COMPANY: **Sweeney**

DRILLING EQUIPMENT: Backhoe Bucket

DRILLING METHOD:

WELL / PROBEHOLE / BOREHOLE NO:

PAGE 1 OF 1 AOI5-BH-16-072

*NORTHING (ft): 182184.59 *GROUND ELEV (ft): **NA** INITIAL DTW (ft): 2

COMPLETED: 6/10/16

COMPLETED:

STATIC DTW (ft): Not Measured WELL CASING DIAMETER (in): NA

LOGGED BY: **D. Downing**

*EASTING (ft): 2621526.01 *TOC ELEV (ft): **NA** BOREHOLE DEPTH (ft): 3

Stantec

WELL DEPTH (ft): **NA** BOREHOLE DIAMETER (in): NA

CHECKED BY: A. Patel

	5 -										
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
			ML	brown to dark brown SILT, trace fine sand, trace s	mall gravel, moist						
	1 -						AOI5-BH-16 -072-0-2			1.1	-
	2 -		SP	brown to dark brown fine SAND, some silt, little sr	nall gravel, wet		AOI5-BH-16 -072-2-3			1.5	
	3 -	<u> </u>		End of boring at 3 ft bgs							_
	4 -										
	5-										5-
	6 -										-
	7 -										_
	8 -										-
/L/0	9 -										-
78. GL 30.	10-										10-
AIE UIUD	11 -										-
IKO IEMPI	12 -										-
AI EC EINO	13 -										-
170 UTC	14 -										-
SORINGS.	15										15-
COB SOIL E	16 -										-
KGREEN A	17 -										-
304 - EVEF	18 -										-
GEO FORM 304 - EVERGREEN AUB SOIL BORINGS, GFJ STANTEC ENVIRO TEMPLATE 010809, GDT 5/10/17	19 -										-

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: Stantec LOCATION: AOI 5 Characterization AOI5-BH-16-073 PAGE 1 OF 1 PROJECT NUMBER: **213402567** *EASTING (ft): 2621513.38 *NORTHING (ft): 182315.12 STARTED 6/10/16 COMPLETED: 6/10/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 3 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: **D. Downing** CHECKED BY: A. Patel

Į	SAMPLING	EQU	IPME	NT: Backhoe Bucket		INATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88								
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)			
•	1 -			FILL; dark brown silt, little fine sand, brick and gra	avel, wet		AOI5-BH-16 -073-0-2			5.8	-			
	3 -			End of boring at 3 ft bgs			AOI5-BH-16 -073-2-3			6.9	_			
	4 -										_			
	5—										5-			
	6 -										-			
	7 -													
	9 -										-			
.GDI 5/10/1	10-										10-			
-AIE 010509	11 -										-			
VIRO LEMPL	12 -										-			
STANIECEN	13 - 14 -										-			
INGS.GFJ o	15—										15-			
IS SUIL BUR	16 -										-			
GREEN AO	17 -										-			
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS, GPJ STANTEC ENVIRO TEMPLATE 010509, GDT 5/10/17	18 -										_			
GEO FORN	19 -										_			

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-074 PROJECT NUMBER: **213402567** *NORTHING (ft): 182256.31 *EASTING (ft): 2621558.47 STARTED 6/10/16 COMPLETED: 6/10/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 8 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: **D. Downing** CHECKED BY: A. Patel

	SAMPLING			NT: Backhoe Bucket	*COORDINATE SYSTEM AND DAT			SOUTH, I			
	Depth (feet)	Graphic Log	nscs	Description		Sample		Measured Recov. (feet)	Blow	Headspace PID CP (DD (DD (DD (DD (DD (DD (DD (DD (DD (D	Depth (feet)
ı			ML	dark brown SILT, trace fine sand, moist						_	
	1 -						AOI5-BH-16 -074-0-2			9.8	_
	2 -										-
	3 -						-			1.5	
	5-						-			14.6	5-
	6 -										-
	7 -						AOI5-BH-16 -074-6-8			21.8	-
	8 -			End of boring at 8 ft bgs							-
10/17	9 -										-
09.GDT 5/1	10-										10-
1ATE 0105	11 -										-
IVIRO TEMF	12 -										-
TANTEC EN	13 - 14 -										
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17	15—										15-
15 SOIL BOR	16 -										-
GREEN AO	17 -										-
304 - EVER	18 -										-
GEO FORM	19 -										-

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** AOI5-BH-16-075 PAGE 1 OF 1 PROJECT NUMBER: **213402567** *EASTING (ft): 2621581.7 *NORTHING (ft): 182363.04 STARTED 6/10/16 COMPLETED: 6/10/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 5 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: **D. Downing** CHECKED BY: A. Patel

	SAMPLING	AMPLING EQUIPMENT: Backhoe Bucket *COORDINATE S'					PA STATE PLANE				
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
	1 -		ML	dark brown to dark grey SILT, trace fine sand from 0 some medium gravel from 4 to 5 ft, wet [sulfur dioxi 0.4 ppm (4-5 ft)]	0 to 2 ft and 4 to 5 ft, de: 0.5 ppm (2-4 ft),		AOI5-BH-16 -075-0-2			47.9	-
	2 -						-			88.8	-
	4 - 5-						AOI5-BH-16 -075-4-5			108.2	- 5-
	6 -			End of boring at 5 ft bgs							-
	7 - 8 -										-
5/10/17	9 -										-
TE 010509.GDT	10 –										10-
ENVIRO TEMPLA	12 - 13 -										-
3PJ STANTECE	14 -										-
SOIL BORINGS.C	15 <i>-</i> -										15-
GREEN AOIS S	17 -										-
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17	18 <i>-</i> 19 <i>-</i>										-
GEO F.											

PROJECT: Marcus Hook Industrial Complex **LOCATION: AOI 5 Characterization**

COMPLETED: **6/9/16**

COMPLETED:

PROJECT NUMBER: **213402567**

DRILLING: STARTED 6/9/16

INSTALLATION: STARTED DRILLING COMPANY: **Sweeney**

DRILLING EQUIPMENT: Backhoe Bucket

DRILLING METHOD:

SAMPLING FOLIPMENT: Backhoe Bucket

WELL / PROBEHOLE / BOREHOLE NO:

AOI5-BH-16-076 PAGE 1 OF 1

*NORTHING (ft): 182159.14 *GROUND ELEV (ft): **NA** INITIAL DTW (ft): 2

STATIC DTW (ft): Not Measured WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA

LOGGED BY: **D. Downing**

*EASTING (ft): 2621990.52 *TOC ELEV (ft): **NA** BOREHOLE DEPTH (ft): 3 WELL DEPTH (ft): **NA**

CHECKED BY: A. Patel

Stantec

Į	SAMPLING	G EQU	IPME	NT: Backhoe Bucket	COORDINATE SYSTEM AND DAT	M AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88					
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
-	1 -			FILL; dark brown to dark grey silt and fine sand, ste	ones, moist		AOI5-BH-16 -076-0-2			16.5	
	2 -		ML	dark brown to dark grey SILT, staining, wet End of boring at 3 ft bgs			AOI5-BH-16 -076-2-3			61.7	- -
	4 -			End of boring at 3 ft bgs							-
	5-										5-
	6 -										
	7 -										-
/	9 -	-									_
9.GDI 3/10/	10-	-									10-
LAIE UIUSU	11 -										
	12 - 13 -										
SIMILED	14 -										=
ONINGS.GL	15-										15-
AUIS SUIL E	16 -										
GEO FORM 304 - EVERGREEN ADIS SOIL BORINGS.GPJ STANTEC ENVIRO LEMPLATE 010503:GDT 5/10/1/	17 <i>-</i> 18 <i>-</i>										
FURIM 304 - 1	19 -										-

PROJECT: Marcus Hook Industrial Complex **LOCATION: AOI 5 Characterization**

PROJECT NUMBER: **213402567**

STARTED 6/9/16 COMPLETED: **6/9/16** INSTALLATION: STARTED COMPLETED:

DRILLING COMPANY: Sweeney

DRILLING EQUIPMENT: Backhoe Bucket

DRILLING METHOD:

DRILLING:

SAMPLING FOUIPMENT: Backhoe Bucket

WELL / PROBEHOLE / BOREHOLE NO:

PAGE 1 OF 1 AOI5-BH-16-077

*NORTHING (ft): 182177.24 *GROUND ELEV (ft): NA

*TOC ELEV (ft): NA INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 4 STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA

Stantec

*EASTING (ft): 2622088.67

LOGGED BY: **D. Downing** CHECKED BY: A. Patel

*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOLITH NAD83: NAVD 88

	SAMPLING	<u>EQU</u>	IPME	NT: Backhoe Bucket	*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88					
	Depth (feet)	Graphic Log	nscs	Description	Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace ON PID (Dbm)	Depth (feet)
	1 -			FILL; dark brown silt, stone, cinders, brick, wood f	ragments, wet	AOI5-BH-16 -077-0-2			9.3	-
	2 - 3 - 4 -					AOI5-BH-16 -077-2-4			21.5	
	5-			End of boring at 4 ft bgs						5-
	6 - 7 -									
	8 -									-
/10/1/	9 -									-
J10509.GDT 5	10 <i>-</i> -									10-
O LEMPLAIE	12 -									-
AN LEC ENVIR	13 -									
KINGS.GPJ SI.	14 - 15-									15-
AUIS SUIL BUF	16 -									-
EVERGREEN ,	17 - 18 -									-
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS GPJ STANTEC ENVIRO LEMPLATE 010509.GDT 5/10/1/	19 -									
5										

GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS. GPJ STANTEC ENVIRO TEMPLATE 010509, GDT 5/10/17

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: Stantec **LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-078 PROJECT NUMBER: **213402567** *EASTING (ft): 2621958.28 *NORTHING (ft): 182009.16 STARTED 6/9/16 COMPLETED: **6/9/16** DRILLING: *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 3 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA

LOGGED BY: **D. Downing**

CHECKED BY: A. Patel

DRILLING METHOD:

L	SAMPLING	3 EQU	IPMEI		COORDINATE SYSTEM AND DATE			SOUTH, I	NAD83; N	AVD 88	
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
	1 -			FILL; grey to brown fine sand, some silt, cinders, d	ry		AOI5-BH-16 -078-0-2			2.9	-
	2 -		ML	dark brown SILT, some fine sand, wet							_
	3 -			End of boring at 3 ft bgs			AOI5-BH-16 -078-2-3			47.7	_
	5-	-									5-
	6 -	-									-
	7 -	-									_
	8 -	_									_
10/17	9 -										_
19.GDT 5/1	10-	_									10-
ATE 01050	11 -	_									_
RO TEMPL	12 -	-									_
TEC ENVI	13 -	_									_
GPJ STAN	14 -	_									_
BORINGS.	15-										15-
AOI5 SOIL	16 -										
RGREEN	17 -	-									_
1 304 - EVE	18 -										
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17	19 -										_

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-079 PROJECT NUMBER: **213402567** *NORTHING (ft): 181824.6 *EASTING (ft): **2622198.98** STARTED 6/9/16 COMPLETED: **6/9/16** DRILLING: *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 6 BOREHOLE DEPTH (ft): 8 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: **D. Downing** CHECKED BY: A. Patel

5	SAMPLING	EQUI	IPMEI	NT: Backhoe Bucket	COORDINATE SYSTEM AND DA			SOUTH, I	NAD83; N	AVD 88	
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
	1 -		ML	dark brown to dark grey SILT, some to trave fine s 6 to 8 ft, staining from 2 to 4 ft, wood debris from 2	and from 2 to 4 ft and 2 to 4 ft, moist		AOI5-BH-16 -079-0-2			58	
	2 -										-
	3 -						-			7.5	_
	4 - 5-						AOI5-BH-16 -079-4-5			9.8	5-
	6 -			wet at 6 ft							∑ -
	7 -						-			0.2	
17	9 -			End of boring at 8 ft bgs							-
09.GDT 5/10/	10-										10-
MPLATE 0105	11 - 12 -										_
C ENVIRO TE	13 -										-
GPJ STANTE	14 -										-
GEO FORM 304 - EVERGREEN ADI5 SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17	15 <i>-</i> -										15-
REEN AOI5 SC	17 -										
304 - EVERGR	18 -										-
GEO FORM	19 -										-

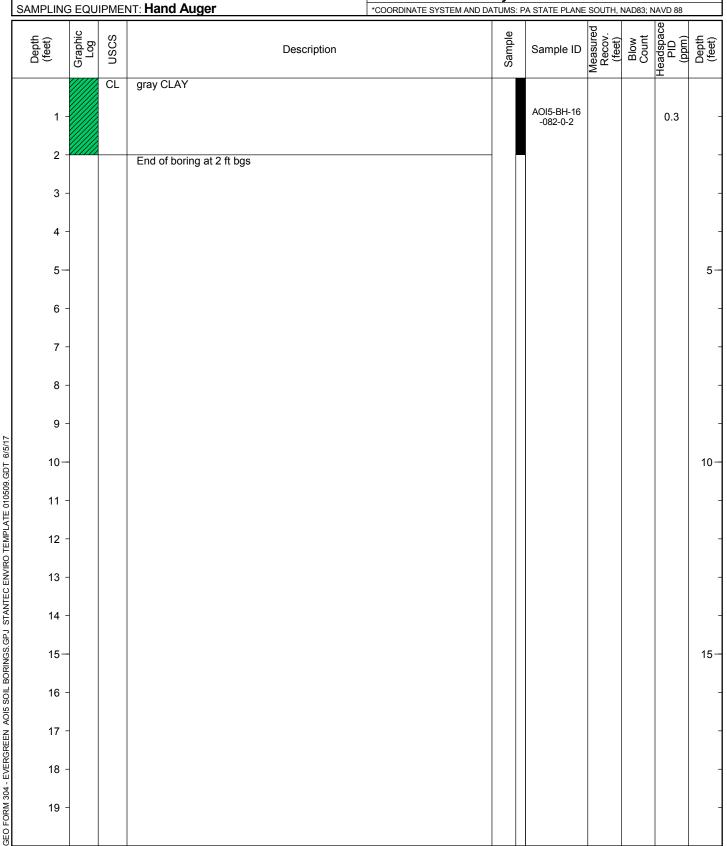
PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-080 PROJECT NUMBER: **213402567** *NORTHING (ft): 181680.74 *EASTING (ft): 2622178.63 STARTED 6/9/16 COMPLETED: **6/9/16** DRILLING: *GROUND ELEV (ft): NA *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 3 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: **D. Downing** CHECKED BY: A. Patel

s	AMPLING	G EQU	IPME		COORDINATE SYSTEM AND DAT			SOUTH, I			
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace Namber Name Name Name Name Name Name Name Name	Depth (feet)
	1 ·			silt and fine sand to clay, rocks, cinders, wet			AOI5-BH-16 -080-0-2			0	-
	3			End of boring at 3 ft bgs			AOI5-BH-16 -080-2-3			1.8	-
	4			End of boiling at 3 it bys							-
	5-										5-
	6 ·										-
	8 -	_									=
11/01/0	9										_
oliobus.GDI	10 - 11 ·										10-
J EIMPLAIE	12	_									-
AN I EC LIVE	13	-									=
10 CP3.00V	14 · 15 -										15-
JIS SOIL BON	16	-									-
GEO FORM 304 - EVERGREEN AUD SOIL BORINGS, GPJ STANTEC ENVIRO TEMPLATE 010309, GDT STUTT	17 ·										=
- +00 MINO	19										=

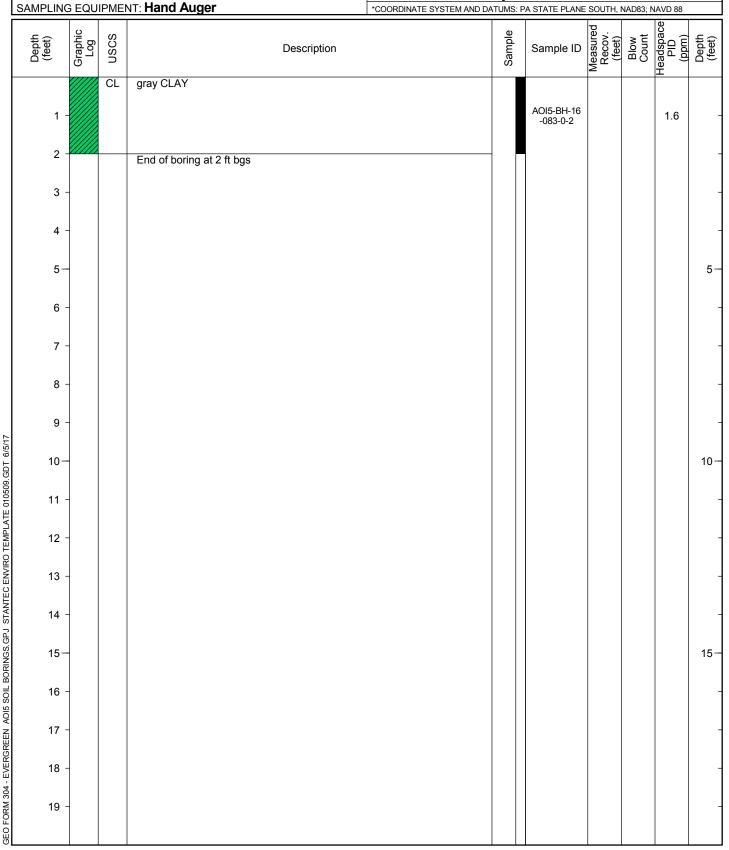
PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-081 PROJECT NUMBER: **213402567** *EASTING (ft): 2622360.46 *NORTHING (ft): 181786.57 STARTED 6/17/16 COMPLETED: 6/17/16 DRILLING: *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 12 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: **D. Downing** CHECKED BY: A. Patel

SAMPLIN	G EQUI	PME	NT: Backhoe Bucket *coo	*COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88						
Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
1			FILL; gravel with coarse sand, pebbles, cobbles, brow pieces of liner from 3 to 4 ft, pockets of clay from 4 to	n-grey, odor, 5 ft, dry		AOI5-BH-16 -081-0-2			5	-
3						-			1	-
4 5-						- AOI5-BH-16 -081-4-5			4	- 5-
6			FILL; gravel with clay and sand, brown-grey, clay cont depth, pottery pieces from 6 to 7 ft, dry	ent increasing with		-			1	-
8		CL	brown to slightly orange CLAY, little silt, dry to becom	es moist from 10 to		-			0	-
3/10/17			12 ft			-			0	-
10- 10- 11	-					-			0	10-
JIRO TEMPLAT			End of boring at 12 ft bgs			-			0	-
13 STANTEC EN	-									-
BORINGS.GPJ	_									15-
16 YOIS SOIF	-									- -
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17 10 11 12 12 11 12 11 11 11 11 11 11 11 11	-									-
GEO FORM	-									-

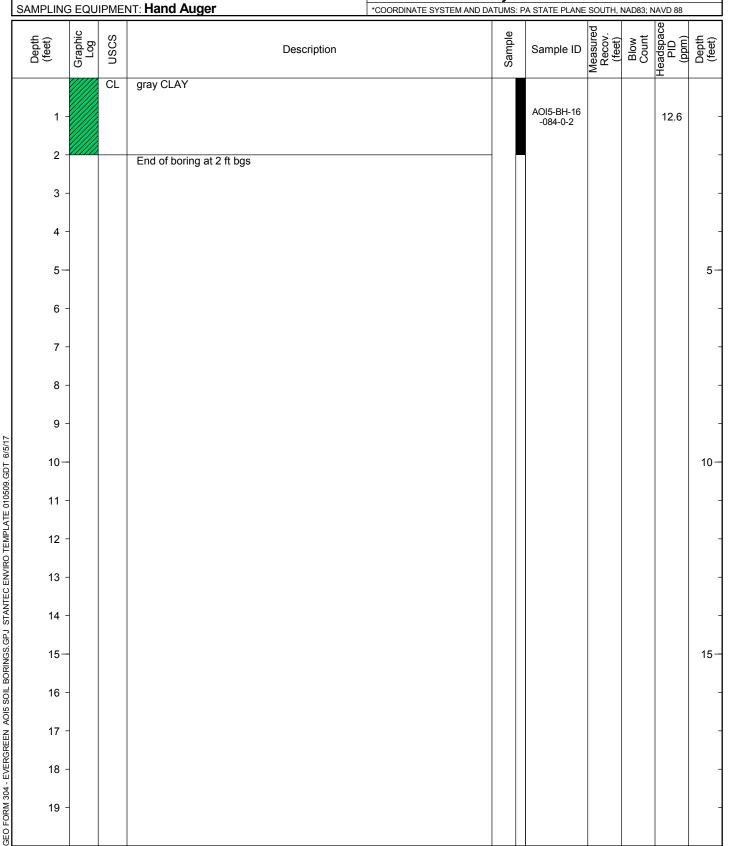
PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** AOI5-BH-16-082 PAGE 1 OF 1 PROJECT NUMBER: **213402567** *EASTING (ft): 2621500.25 *NORTHING (ft): 182304.57 STARTED 12/9/16 COMPLETED: 12/9/16 DRILLING: *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Measured BOREHOLE DEPTH (ft): 2 **DRILLING COMPANY: Stantec** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Hand Auger WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: K. McCorry CHECKED BY: A. Patel



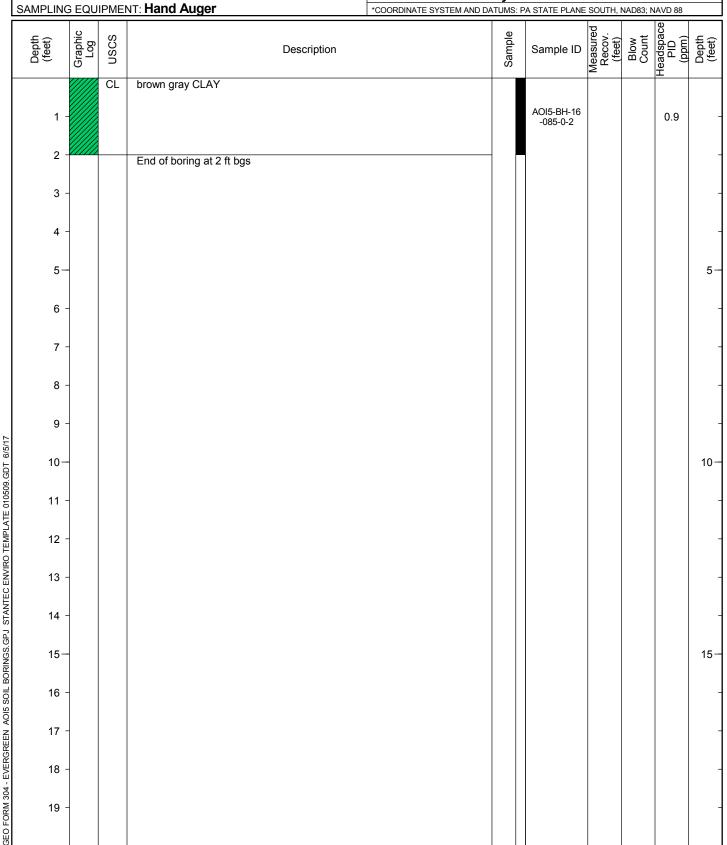
PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** AOI5-BH-16-083 PAGE 1 OF 1 PROJECT NUMBER: **213402567** *EASTING (ft): 2621610.49 *NORTHING (ft): 182458.21 STARTED 12/9/16 COMPLETED: 12/9/16 DRILLING: *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Measured BOREHOLE DEPTH (ft): 2 **DRILLING COMPANY: Stantec** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Hand Auger WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: K. McCorry CHECKED BY: A. Patel SAMPLING EQUIPMENT: Hand Auger



PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** AOI5-BH-16-084 PAGE 1 OF 1 PROJECT NUMBER: **213402567** *EASTING (ft): 2621603.55 *NORTHING (ft): 182387.9 STARTED 12/9/16 COMPLETED: 12/9/16 DRILLING: *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Measured BOREHOLE DEPTH (ft): 2 **DRILLING COMPANY: Stantec** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Hand Auger WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: K. McCorry CHECKED BY: A. Patel



PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** AOI5-BH-16-085 PAGE 1 OF 1 PROJECT NUMBER: **213402567** *EASTING (ft): 2621594 *NORTHING (ft): 182322.79 STARTED 12/9/16 COMPLETED: 12/9/16 DRILLING: *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Measured BOREHOLE DEPTH (ft): 2 **DRILLING COMPANY: Stantec** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Hand Auger WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: K. McCorry CHECKED BY: A. Patel



PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: Stantec **LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-16-086 PROJECT NUMBER: **213402567** *NORTHING (ft): 181963.42 *EASTING (ft): 2621707.71 STARTED 12/9/16 COMPLETED: 12/9/16 DRILLING: *GROUND ELEV (ft): NA *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Measured BOREHOLE DEPTH (ft): 2 DRILLING COMPANY: **Stantec** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Hand Auger WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: K. McCorry CHECKED BY: A. Patel

L	SAMPLING	EQU	IPME		COORDINATE SYSTEM AND DATE				NAD83; N	IAVD 88	
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
	1 -		SM	brown silty SAND			AOI5-BH-16 -086-0-2			5.6	-
	3 -	_		End of boring at 2 ft bgs							-
	4 -	_									-
	5 - 6 -										5-
	7 -										-
	8 -										-
9.GDT 6/5/17	10-	_									10-
MPLATE 01050	11 - 12 -										-
EC ENVIRO TE	13 -										-
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 6/5/17	14 -										- -
SOIL BORING	15 <i>-</i> 16 -										15 <i>-</i> -
RGREEN AOIS	17 -										-
JRM 304 - EVEF	18 - 19 -										-
GEO FC											

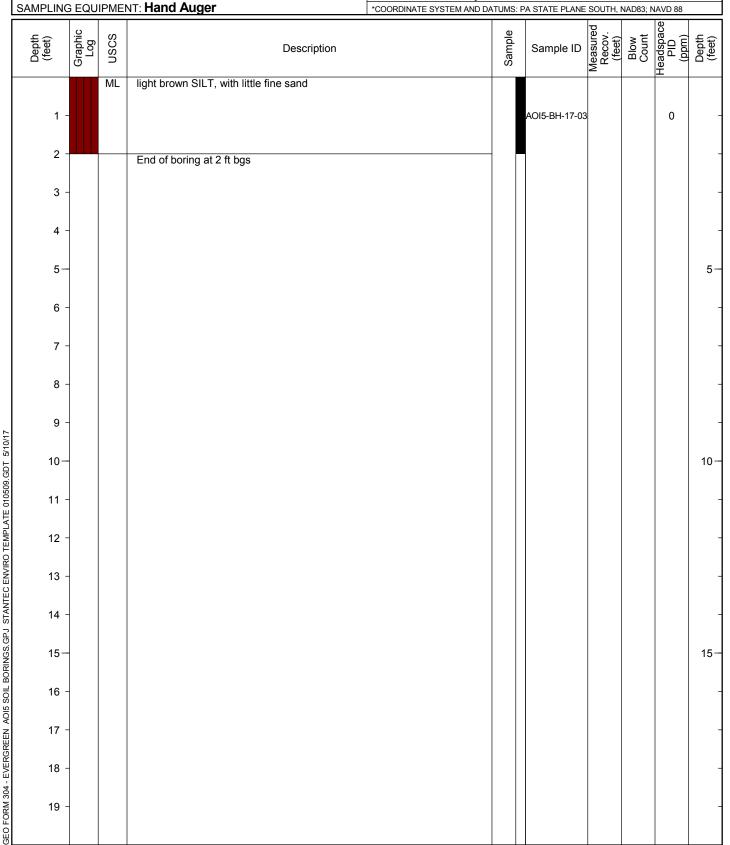
PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-17-01 PROJECT NUMBER: **213402567** *NORTHING (ft): 184161.06 *EASTING (ft): 2622773.09 STARTED 3/22/17 COMPLETED: 3/22/17 DRILLING: *GROUND ELEV (ft): NA *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 2 DRILLING COMPANY: **Stantec** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Hand Auger WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: D. Hopkins CHECKED BY: A. Patel

L	SAMPLING	EQU	IPMEI	NT: Hand Auger	*COORDINATE SYSTEM AND DA			SOUTH,			
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
ı			ML	light brown SILT, with little fine sand						_	
	1 -						AOI5-BH-17-01			0	-
	2 -			End of boring at 2 ft bgs							_
	3 -										_
	4 -										-
	5-										5-
	6 -										-
	7 -										-
	8 -										
5/10/17	9 -										
09.GDT	10-										10-
ATE 0105	11 -										-
O TEMPL	12 -										_
EC ENVIR	13 -										-
J STANTE	14 -										=
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17	15-										15-
SOIL BOF	16 -										-
EN AOI5	17 -										-
EVERGRE	18 -										-
RM 304 - I	19 -										_
GEO FO											

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-17-02 PROJECT NUMBER: **213402567** *NORTHING (ft): 184362.62 *EASTING (ft): 2622632.46 STARTED 3/22/17 COMPLETED: 3/22/17 DRILLING: *GROUND ELEV (ft): NA *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Measured BOREHOLE DEPTH (ft): 2 DRILLING COMPANY: **Stantec** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Hand Auger WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: D. Hopkins CHECKED BY: A. Patel

L	SAMPLING	EQU	IPMEI	NT: Hand Auger	*COORDINATE SYSTEM AND DAT			SOUTH, I	NAD83; N	IAVD 88	
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
Ī			ML	dark brown SILT, organic matter and fine gravel							
	1 -						AOI5-BH-17-02			0	-
	2 -			End of boring at 2 ft bgs							-
	3 -										-
	4 -										-
	5-										5-
	6 -										-
	7 -										
	8 -										
	9 -										
JT 6/5/17	10-										10-
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 6/5/17	11 -										
EMPLATE	12 -										
ENVIRO T	13 -										
STANTEC	14 -										
GS.GPJ &	15-										15-
IL BORIN	16 -										
AOI5 SC	17 -										
ERGREEN	18 -										
1 304 - EV											
GEO FORM	19 -										

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** AOI5-BH-17-03 PAGE 1 OF 1 PROJECT NUMBER: **213402567** *EASTING (ft): 2622539.76 COMPLETED: 3/22/17 *NORTHING (ft): 183987.62 STARTED 3/22/17 DRILLING: *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 2 **DRILLING COMPANY: Stantec** STATIC DTW (ft): **Not Measured** WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Hand Auger WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA **DRILLING METHOD:** LOGGED BY: D. Hopkins CHECKED BY: A. Patel SAMPLING EQUIPMENT: Hand Auger



PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-17-04 PROJECT NUMBER: **213402567** *NORTHING (ft): 184311.58 *EASTING (ft): **2622399.13** STARTED 3/22/17 COMPLETED: 3/22/17 DRILLING: *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 2 DRILLING COMPANY: **Stantec** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Hand Auger WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: D. Hopkins CHECKED BY: A. Patel

3	SAMPLING	EQU	IPME	NT: Hand Auger	*COORDINATE SYSTEM AND DAT			SOUTH,	NAD83; N	IAVD 88	
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
F			ML	light to dark brown SILT, with little fine sand and c	slay					_	
	1 -						AOI5-BH-17-04			0	-
	2 -			End of boring at 2 ft bgs							-
	3 -										-
	4 -										-
	5-										5-
	6 -										
	7 -										
	8 -										-
/17	9 -										
.GDT 5/10	10-										10-
TE 010509	11 -										-
O TEMPLA	12 -										-
EC ENVIR	13 -										-
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17	14 -										-
ORINGS.G	15-										15-
NE SOIL BO	16 -										-
SREEN AC	17 -										-
04 - EVERC	18 -										-
D FORM 30	19 -										-
Ğ E											

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec** LOCATION: AOI 5 PAGE 1 OF 1 AOI5-BH-17-05 PROJECT NUMBER: 213402567 COMPLETED: 4/18/17 *NORTHING (ft): 184200 *EASTING (ft): 2623166 DRILLING: STARTED 4/17/17 *GROUND ELEV (ft): 9.7 *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Measured BOREHOLE DEPTH (ft): 20 DRILLING COMPANY: Parratt Wolff STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA DRILLING EQUIPMENT: Truck-Mounted CME-75 BOREHOLE DIAMETER (in): 6 WELL CASING DIAMETER (in): ---DRILLING METHOD: **HSA** LOGGED BY: ADK CHECKED BY: JKD SAMPLING EQUIPMENT: Backhoe Bucket/Split Spoon *COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88 Sample Graphic Log USCS Blow Count Depth (feet) Description Sample ID

Depth (feet) APPARENT FILL [crushed stone, bricks, cobbles, gravel, and debris (saturated at 2' bgs; apparent perched water; sheen observed)] 0.0 3 Brownish gray (stained greenish gray and black) CLAY/SILT, trace very 4 fine sand, trace coarse to fine gravel (laminated appearance) (some organic material; roots) (wet to saturated; NAPL observed around soil 5 5 peds) 0.0 6 LOCATION CLEARED TO 8 FT BELOW GROUND SURFACE VIA 7 BACKHOE. SWITCH TO HOLLOW STEM AUGERS. 8 SAME (brownish gray with common reddish yellow mottles) (slightly 2 7 7 micaceous) (trace organic material) (moist) 0.0 9 1.8 8 10 10 SAME (NAPL observed in root casts) (sand content increases with depth 1 to some fine sand) (wet) 3 EVERGREEN BORING AOI 5 - SLUDGEDELINEATION BORINGS GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 1.7 3.4 11 4 4 12 SAME (many reddish vellow mottles) (finely laminated with micaceous 3 silt and very fine sand) (moist to wet) 5 13 1.1 0.0 8 14 0.0 SAME (wet to saturated) WOH CL Gray to bluish gray CLAY/SILT, little very fine to fine sand (slightly 2 15 15 15 micaceous) (trace lignite) (moist) 2 0.0 16 SAME (reddish yellow and slightly cemented) (moist) 3 0.0 4 Light gray and white medium to coarse to fine SAND, trace to little 17 SP 1.4 15 pebbles, trace silt (slightly glauconitic) (sand fraction is multicolored) 2.7 30 (coarse gravel in drive shoe) (saturated) 18 2 WEATHERED BEDROCK [varicolored clay/silt, little fine sand 3 (micaceous) (moist) (fabric preserved)] 19 1.3 0.0 5 20 20 *Boring terminated at 20 ft below ground surface* 21 22 23 24 25 25 26 27 28 29

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec** LOCATION: AOI 5 AOI5-BH-17-06 PAGE 1 OF 1 PROJECT NUMBER: 213402567 *NORTHING (ft): 183967 *EASTING (ft): 2623289 DRILLING: STARTED 4/17/17 COMPLETED: 4/18/17 *TOC ELEV (ft): NA *GROUND ELEV (ft): 10 INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Measured BOREHOLE DEPTH (ft): 22 DRILLING COMPANY: Parratt Wolff STATIC DTW (ft): Not Measured WELL DEPTH (ft): NA DRILLING EQUIPMENT: Truck-Mounted CME-75 BOREHOLE DIAMETER (in): 6 WELL CASING DIAMETER (in): ---

LOGGED BY: ADK

CHECKED BY: JKD

DRILLING METHOD: **HSA**

SAMPLING EQUIPMENT: Backhoe Bucket/Split Spoon *COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88 Sample Graphic USCS Blow Count Depth (feet) Log Description Sample ID APPARENT FILL [crushed stone, bricks, cobbles, some silty gravel and sand (dry)] 0.0 2 3 SAME (clay/silt mixed with gravel, few cobbles, bricks) (wet; perched water seepage from gravelly zones) 0.0 5 5 Brownish gray and black CLAY/SILT, some coarse to fine gravel, little 6 fine sand (common pale olive mottles) (some organic material; roots and thin peat layers) (coarse blocky to massive structure) (wet; NAPL 0.0 7 globules and sheen present on seeping water) LOCATION CLEARED TO 8 FT BELOW GROUND SURFACE VIA BACKHOE. SWITCH TO HOLLOW STEM AUGERS. 8 5 NO RECOVERY 2 9 0.1 0.1 9 10 10 SAME (mottles are yellowish brown) (color change to brown at 11' +/-) **WOH** 3EO FORM 304 - EVERGREEN BORING AOI 5 - SLUDGEDELINEATION_BORINGS. GPJ STANTEC ENVIRO TEMPLATE 010509. GDT 1.1 0.1 11 2 1 12 ŌĹ Dark brown CLAY/SILT, and to some organic material (wet to saturated) 0.1 VOH/1 PEAT LAYER 13 0.9 0.0 2 14 SM Light gray very fine to fine SAND, trace clay (trace to little lignite) (wet to saturated) 2 0.0 15 1.3 15 4 5 16 SAME (coarser than above; few lenses of medium sand, trace silt) (few 3 thin peat layers) (change in drive shoe to reddish yellow coarser sand) 1 17 1.4 0.0 (saturated) 1 2 18 SW. Reddish yellow and reddish brown coarse to fine SAND, some coarse 2 SM gravel (sub-rounded sandstone), trace pebbles, trace silt (saturated) 14 19 1.0 1.0 17 14 20 20 SM Reddish yellow very fine to fine SAND, little to some silt, trace fine gravel 4 0.0 (micaceous) (wet) 12 0.0 GM A 1.1 21 Coarse GRAVEL (wet) 29 0.0 WEATHERED BEDROCK [varicolored fine to medium sand, trace 50/2" 22 silt/clay (micaceous) (moist) (fabric preserved)] *Spoon refusal encountered at 22 ft below ground surface* 23 24 25 25 26 27 28 29

LOCATION: AOI 5

DRILLING:

PROJECT NUMBER: **213402567**

COMPLETED: 4/19/17

STARTED **4/17/17** INSTALLATION: STARTED COMPLETED:

DRILLING COMPANY: Parratt Wolff

DRILLING EQUIPMENT: Truck-Mounted CME-75

DRILLING METHOD: **HSA**

WELL / PROBEHOLE / BOREHOLE NO:

AOI5-BH-17-07 PAGE 1 OF 1

*NORTHING (ft): 183663 *GROUND ELEV (ft): 9.1 INITIAL DTW (ft): Not Measured

STATIC DTW (ft): Not Measured WELL CASING DIAMETER (in): ---

LOGGED BY: **ADK**

*EASTING (ft): 2623374 *TOC ELEV (ft): **NA** BOREHOLE DEPTH (ft): 30 WELL DEPTH (ft): **NA** BOREHOLE DIAMETER (in): 6

Stantec

CHECKED BY: **JKD**

S	SAMPLIN	G EQU	IPMEN	NT: Backhoe Bucket/Split Spoon	*COORDINATE SYSTEM AND DA	TUMS:	PA STATE PLANE	SOUTH,	NAD83; N	NAVD 88	
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
	1 · 2 · 3 · 4 · 5 -			APPARENT FILL [crushed stone, bricks, wood, oblack acid sludge mixed with sandy clay/silt matriseeps and globules)] *Samples collected for acid sludge determination	ix (dry to wet; few NAPL		AOI5-BH-17-07 3' AOI5-BH-17-07 4-5'			0.2	5-
	6 · 7 · 8 ·			LOCATION CLEARED TO 8 FT BELOW GROUD BACKHOE. SWITCH TO HOLLOW STEM AUGION STEM AUGION (*sample collected for acid s	ERS.				2		
	9			(wet to saturated) (SO2 = 1.9 ppm)	augo coloaug /	X	AOI5-BH-17-07 8-10'	0.3	7 4 3	0.0	
	10- 11		-CL	Brownish gray CLAY/SILT (some organic material layers, leaf mats) (moist to wet) (SO2 = 0.1 ppm)	al; roots and thin peat			1.0	1 2 1 2	0.0	10
	13		CL	Light gray CLAY/SILT, little very fine sand, trace (few faint dark greenish gray mottles) (moist to d				1.2	7 8 7 15	0.0	
	14 15-			SAME (light gray with light greenish gray laminat (intensely mottled) (trace gravel with depth) (moi ppm)	ions) (trace pebbles) st to damp) (SO2 = 0.4			0.9	3 9 8 25	0.0	15
	16 17		GW- GM	SAME (some coarse to medium gravel) (gravel lo	odged in drive shoe)			1.0	10 21 50/4"	0.0	
	18 19			Gray fine to coarse GRAVEL and coarse to fine are heterogeneous and varicolored; some in-situ apparent) (saturated to wet)				1.5	27 39 48	0.0	
	20 - 21		SM	Interbedded yellowish brown fine to coarse GRA fine SAND, little to some silt (0.5' beds) (saturate	VEL and olive brown ed) (SO2 = 0.2 ppm)			1.2	34 9 5 14 36	0.0	20
	22			SAME (0.4-0.5' beds) (coarsening upward seque (saturated to wet)	nces) (micaceous)			1.5	12 13 13 39	0.0	
	24 25 -	- -		SAME (coarse gravel) (saturated)				0.4	16 6 9	0.0	25
	26 27			SAME (saturated)	,	\bigvee		1.2	20 9 39	0.0	
	28	_		SAME (wet)		$\langle \rangle$		1.2	16 13 6	0.0	
	29 30 -			WEATHERED BEDROCK [green and black fine silt/clay (micaceous) (moist) (fabric preserved)]		X		1.8	9 9 27	0.0	30
				*Boring terminated at 30 ft below ground surface	*						

LOCATION: **AOI 5**

DRILLING:

PROJECT NUMBER: **213402567**

STARTED 4/17/17 COMPLETED: 4/19/17

COMPLETED:

INSTALLATION: STARTED

DRILLING COMPANY: Parratt Wolff

DRILLING EQUIPMENT: Truck-Mounted CME-75

DRILLING METHOD: **HSA**

WELL / PROBEHOLE / BOREHOLE NO:

PAGE 1 OF 1 AOI5-BH-17-08

*NORTHING (ft): **183585** *GROUND ELEV (ft): **6.9**

INITIAL DTW (ft): **Not Measured**STATIC DTW (ft): **Not Measured**

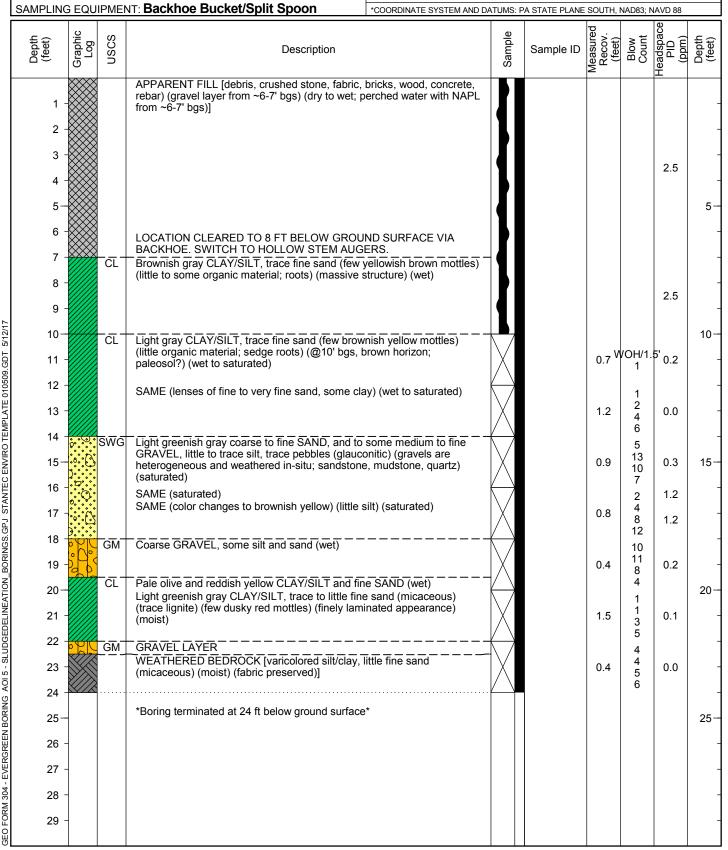
WELL CASING DIAMETER (in): --- LOGGED BY: **ADK**

*EASTING (ft): **2623539***TOC ELEV (ft): **NA**BOREHOLE DEPTH (ft): **24**WELL DEPTH (ft): **NA**

Stantec

WELL DEPTH (ft): **NA**BOREHOLE DIAMETER (in): **6**

CHECKED BY: **JKD**



LOCATION: AOI 5

DRILLING:

PROJECT NUMBER: **213402567**

COMPLETED: 4/20/17

COMPLETED:

DRILLING COMPANY: Parratt Wolff

DRILLING EQUIPMENT: Truck-Mounted CME-75

STARTED 4/20/17

DRILLING METHOD: **HSA**

INSTALLATION: STARTED

WELL / PROBEHOLE / BOREHOLE NO:

AOI5-BH-17-09 PAGE 1 OF 1

*NORTHING (ft): 183343 *GROUND ELEV (ft): 6.2

INITIAL DTW (ft): Not Measured STATIC DTW (ft): Not Measured WELL CASING DIAMETER (in): ---

LOGGED BY: **ADK**

*EASTING (ft): 2623240 *TOC ELEV (ft): **NA** BOREHOLE DEPTH (ft): 28 WELL DEPTH (ft): **NA**

Stantec

BOREHOLE DIAMETER (in): 6

CHECKED BY: **JKD**

SAI	MPLING	S EQUI	PMEN	IT: Backhoe Bucket/Split Spoon	*COORDINATE SYSTEM AND DAT	UMS: P	A STATE PLANE	SOUTH, I	NAD83; N	AVD 88	
3	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
	1 - 2 - 3 -			APPARENT FILL [silt/clay mixed with debris, crubricks, wood, concrete, rebar, pipes, and cobblet						0.1	
	4 - 5- 6 -			*Sample collected for acid sludge determination	1	$\{ \ $	AOI5-BH-17-09 4-5'			0.1	5
	7 - 8 -			LOCATION CLEARED TO 8 FT BELOW GROU BACKHOE. SWITCH TO HOLLOW STEM AUG	ERS.	{				0.1	
	9 - 10-			SAME (large brick fragment, black fill in drive should be should b		\searrow		0.5	2 2 4 4	0.7	10
	11 - 12 -		-cī	(wet) Black CLAY/SILT, trace fine sand (some to and		\searrow		0.4	1 2 2 5	16	
	13 - 14 -		-cL	and leaf mats (change in drive shoe to light gray saturated; NAPL apparent) Pale green and light gray CLAY/SILT, trace fine	clay/silt) (wet to	\searrow		1.5	1 1 2 4	144	
	15 <i>-</i> 16 -		GW- GM	(laminated appearance) (few pebbles) (few coars depth) (change in drive shoe to gravel) (moist) Yellowish brown coarse to fine GRAVEL, some to	se sand laminations with	\searrow		1.2	4 5 16	2.2	15
	17 - 18 -			sand, little to trace silt (slightly micaceous) (grav quartz, red sandstone, mudstone weathered in-s	els are heterogeneous; itu) (moist)	\searrow		1.2	17 36 48 20	0.0	
	19 - 20-		-CL	Reddish yellow (oxidized horizon) to light gray Ci fine sand, trace fine gravel (slightly micaceous) ((laminated appearance) (damp)	few black mottles)			1.6	24 14 8	0.1	20
	21 - 22 -		sc	SAME (pinkish gray color) (grades with depth to clay/silt) (moist) Olive brown very fine SAND, some clay/silt (slight)				1.4	5 6 8 4	0.0	
2	23 - 24 -		GM	(micaceous) (saturated to wet) Brownish yellow and olive brown coarse to media		\nearrow		0.5	9 31 38 11	0.0	
	25 – 26 <i>-</i>			to coarse sand, little silt/clay) (coarsely micaceon heterogeneous red sandstone, mudstone, quartz WEATHERED BEDROCK [slightly weathered fe (fabric preserved)]	(wet to moist)	X		0.6	17 50/3"	0.0	25
	27 - 28 - 29 -			*Spoon refusal encountered at 26 ft below groun	d surface*			0.1	50/1"		

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-17-010 PROJECT NUMBER: **213402567** *NORTHING (ft): 183566.85 *EASTING (ft): 2622992.42 STARTED 4/20/16 COMPLETED: 4/20/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 3 DRILLING COMPANY: Sweeney STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: A. Patel CHECKED BY: J. DeBoer

	SAMPLING	3 EQU	PMEI		*COORDINATE SYSTEM AND DAT	UMS:	PA				AVD 88	
	Depth (feet)	Graphic Log	nscs	Description		Sample		Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID W	Depth (feet)
-	1 · 2 · 3 · 4 ·			FILL; chert gravel, with some brown clayey sand, water begins filling in hole at 2 ft End of boring at 3 ft bgs	no odor, dry			AOI5-BH-17 -010-1-2			0	-
	5-	-										5-
	6 · 7 ·	-										
	8 -	_										-
/10/17	9 -	_										=
10509.GDT 5	10 - 11 -											10-
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17	12 -	-										-
TEC ENVIRO	13 -	-										-
S.GPJ STAN	14 -											- 15-
SOIL BORING	15 - 16 -	-										15-
REEN AOIS	17 -	-										-
1 304 - EVERG	18 -											-
GEO FORM	19 -											_

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: Stantec LOCATION: AOI 5 Characterization AOI5-BH-17-011 PAGE 1 OF 1 PROJECT NUMBER: **213402567** *EASTING (ft): 2622960.89 *NORTHING (ft): 183546.32 STARTED 4/20/16 COMPLETED: 4/20/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): **NA** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 3 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: A. Patel CHECKED BY: J. DeBoer

Į	SAMPLING	EQU	IPME	NT: Backhoe Bucket	*COORDINATE SYSTEM AND DA	TUMS: I	PA STATE PLANE	SOUTH, I	NAD83; N	IAVD 88	-
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace DAM PID (ppm)	Depth (feet)
Ē	1 - 2 -			FILL; chert gravel, with some brown sand and clar			AOI5-BH-17 -011-1-2			1	-
	3 -			at 3 ft: clayey chert gravel with black staining, son observed End of boring at 3 ft bgs	ne odor, NAPL						-
	5—	_									5-
	6 - 7 -										-
	8 -										-
/1/0	9 -	_									-
303.GD 3/	10-										10-
	11 - 12 -										-
EINVIII C	13 -										-
0 0 0 0 0	14 -										-
DONINGS.	15—										15-
AOI3 SOIL	16 - 17 -										_
באפאפוו	18 -										_
GEO FORM 304 - EVERGREEN ADIS SOIL BORINGS, GPJ STANTEC ENVIRO TEMPLATE 010509, GDT \$10717	19 -										-
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PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI 5 Characterization** PAGE 1 OF 1 AOI5-BH-17-012 PROJECT NUMBER: **213402567** *NORTHING (ft): 183503.05 *EASTING (ft): 2622887.55 STARTED 4/20/16 COMPLETED: 4/20/16 DRILLING: *GROUND ELEV (ft): NA *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 3 DRILLING COMPANY: Sweeney STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: A. Patel CHECKED BY: J. DeBoer

L	SAMPLING	G EQU	IPMEI		COORDINATE SYSTEM AND DAT	UMS:		SOUTH, I	NAD83; N	IAVD 88	
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (ppm)	Depth (feet)
GEO FORM 304 - EVERGREEN AOIS SOIL BORINGS.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 5/10/17		Graphic			e clay, no odor, dry			Measured Necov. Recov. (feet) 'F'		88 Headsbace PlD P	(feet) (feet)
AOI5 SOIL BO	16 -	-									-
EVERGREEN /	17 - 18 -	-									-
GEO FORM 304 -	19 -	-									-

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: Stantec **LOCATION: AOI 5 Characterization** AOI5-BH-17-013 PAGE 1 OF 1 PROJECT NUMBER: **213402567** *EASTING (ft): 2622861.15 *NORTHING (ft): 183486.18 STARTED 4/20/16 COMPLETED: 4/20/16 DRILLING: *GROUND ELEV (ft): **NA** *TOC ELEV (ft): NA INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 2 DRILLING COMPANY: **Sweeney** STATIC DTW (ft): Not Measured WELL DEPTH (ft): **NA** DRILLING EQUIPMENT: Backhoe Bucket WELL CASING DIAMETER (in): NA BOREHOLE DIAMETER (in): NA DRILLING METHOD: LOGGED BY: A. Patel CHECKED BY: J. DeBoer SAMPLING FOLIPMENT: Backhoe Bucket

SA	MPLING	EQU	IPME	NT: Backhoe Bucket	*COORDINATE SYSTEM AND DA	TUMS:	PA STATE PLANE	SOUTH,	NAD83; N	IAVD 88	
	Depth (feet)	Graphic Log	nscs	Description		Sample	Sample ID	Measured Recov. (feet)	Blow Count	Headspace ON PID (Dbm)	Depth (feet)
	1 -			FILL; grey chert gravel, some brown sand, no odd			AOI5-BH-17 -013-1.0			0	-
	3 -			water begins seeping in hole at 2 ft; black staining observed End of boring at 2 ft bgs	g, residual NAPL						-
	4 -										-
	5 - 6 -										5-
	7 -										-
	8 -										-
	9 -										10-
010000	11 -										-
	12 - 13 -										-
	14 -										-
500000000000000000000000000000000000000	15—										15-
AOIS SOIL	16 - 17 -										-
4 - העהאטהור. איייייייייייייייייייייייייייייייייייי	18 -										-
GEO FORM 304 - EVERGREEN AUS SOIL BORINGS, GFJ STANTEC ENVIRO TEMPLATE 010309, GJJ 57077	19 -										-

LOCATION: **AOI-5, Tank 593** PROJECT NUMBER: **213402428**

COMPLETED: 6/24/15

PAGE 1 OF 1 MH593-1C

WELL / PROBEHOLE / BOREHOLE NO:

Stantec

DRILLING: STARTED **6/24/15**

INSTALLATION: STARTED

COMPLETED:

NORTHING (ft): EASTING (ft): LATITUDE: LONGITUDE: GROUND ELEV (ft): TOC ELEV (ft):

DRILLING COMPANY: **Sweeney** DRILLING EQUIPMENT: Backhoe

STATIC DTW (ft): Not Encountered WELL DEPTH (ft):

INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 12

DRILLING METHOD:

WELL CASING DIAMETER (in): ---SAMPLING FOUIPMENT: Backhoe LOGGED BY: J. DeBoer

BOREHOLE DIAMETER (in): CHECKED BY: J. Menges

SAMPLING	G EQUI	PME	NT: Backhoe	LOGGED BY: J. DeBoel	<u> </u>	CHECK	ED B	Y: J. N	<u>/lenge</u>	S
Time & Depth (feet)	Graphic Log	nscs	Description		Sample	Time Sample ID	Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)
Time & Depth Carried Principles Control of the Cont		NSCS NSCS	Sand and gravel FILL Dark gray sand, some gravel, moist FILL Orange CLAY with some gray mottling End of boring 12' below ground surface		Sample	Time Sample ID	Recov. (feet)	Blow	Headspac (units) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	Depth (feet)
14	_									-

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: LOCATION: **AOI-5, Tank 593** PROJECT NUMBER: **213402428 Stantec** PAGE 1 OF 1 MH593-2C COMPLETED: 6/24/15 STARTED 6/24/15 NORTHING (ft): EASTING (ft): DRILLING: LATITUDE: LONGITUDE: INSTALLATION: STARTED COMPLETED: GROUND ELEV (ft): TOC ELEV (ft): DRILLING COMPANY: **Sweeney** INITIAL DTW (ft): Not Encountered BOREHOLE DEPTH (ft): 8 DRILLING EQUIPMENT: Backhoe STATIC DTW (ft): Not Encountered WELL DEPTH (ft): DRILLING METHOD: WELL CASING DIAMETER (in): ---BOREHOLE DIAMETER (in):

Description Description	ges		Y: J. N	KED B	CHEC	<u>r</u>	LOGGED BY: J. DeBoe	NT: Backhoe	IPME	3 EQUI	SAMPLING
Sand and gravel FILL Dark gray, coarse SAND, little fine gravel, moist, dark gray at 1' Orange CLAY with some gray mottling. 1145 MH593-2C (1.5) 1155 MH593-2C (3.0) 15 6 7 7 Sand and gravel FILL Dark gray, coarse SAND, little fine gravel, moist, dark gray at 1'	(units) Depth (feet)	Headspace PID (units)	Blow Count	Measured Recov. (feet)	Time Sample ID	Sample		Description	nscs	Graphic Log	Time & Depth (feet)
Orange CLAY with some gray mottling.								Sand and gravel FILL			
Orange CLAY with some gray mottling. 1145 MH593-2C (1.5) 1155 MH593-2C (3.0) 5 6 7							ist, dark gray at 1'			****	
2 -		6						Orange CLAY with some gray mottling.			
3 - (3.0)		3			1145 MH593-2C (1.5)						2
5		19			 1155 MH593-2C (3.0) 						3
6		4									4
7 -	5-	6									5-
	-	1									6
End of boring 8' below ground surface 9 - 10 - 11 - 12 - 13 - 13 -		5									
9 - 10 - 11 - 12 - 12 - 13 -								End of boring 8' below ground surface		(/////)	8
10 — 11 - 12 - 13 - 13 -										-	9
11 - 12 - 13 - 13 -	10-									-	10-
										-	11
										-	12
										_	13
										_	14

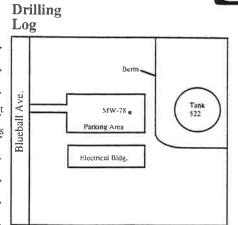
Sym	Samp Samp	Depth (Feet)	Geologic Description	Loring Well Piezomeler	Design Specificatic s
※			0-2.0' BALLAST fill, with brown clay seams.	2	Elevations: 1 2 (feet MSL) 3 4
		1	2.0-5.0° CLAY, dark gray, moist.		Coordinates: X Y
	90	5	5.0-7.0' CLAYEY SAND, brown, moist, hydrocorbon and sulfur smell, oil-stained from 5.5' to 6.5'.		Casing Diameter: 2" 3" 4" 6"
XIIIIIIIII		† † † 10	7.0-15.0' CLAY, gray to green, moist, hydrocarbon odor green sand from 14.5' to 15.0'.		Sand Pack: 20/40_Colorado_Silica_Sand
		†	ی	\$2 PA	Drilled By: Bl. Myers Lagged By: M. Sherrier Completion Date: 2-15-91 Date D-T-W MSL Date Field pH Field EC
X	100	15	15.0-17.0' NR		
		20	· · · · · · · · · · · · · · · · · · ·		Comments: Samples from 0-5', 7-14' taken from cultings: samples from 5-7', 14-15' taken by SS method. Refusal at 17'.
		+	· · · · · · · · · · · · · · · · · · ·	16.5	MP-6 SUN EXEL.
		†	(8)	Depths in Feet from Ground Surface	Project: 169090007 (MP6) Location: Marcus Hook, PA
	17		ST=Shelby Tube SS=Split Spoon C=Cutting	(Not to Scale)	K.W. BROWN & ASSOCIATES, INC.

Design Specifications	Elevations: 1 2 2 4 4 Coordinates: X Y	Type of Casing: Stainless Steel	Screen Style: Nachine Stot Mire Wrop	Sand Pack: 20/40 Calorada Silica Sand Bentonite Seal: \$\infty\$" Pellets \$\infty\$ Hole Plug \$\infty\$ Surry	Grout Type: Lype Partiand Weight:	Oral Rig: Hollow Stem Skotory Cornel By. B 1. Myers. Bros. Inc. Logged By. FH Completion Date: 09/03/91	Date D-T-W MSL. Date Field pH Field EC			Comments:		FR KWBES	SUR KWB91-5	Project: 169091007—265 Location: Marcus Hook, PA
Mc Well Piezometer	3	0	-12501 		. 15 (15 (15 (15 (15 (15 (15 (15 (15 (15			20	4.0	1111111111	11111111111	06 = 06	Depths in Feet	from Ground Surface (Not to Scale)
है है और हुँ Geologic Description		+ 2 2-4' SILI TO CLAY, brown, moist, loose + 3	4 4-6' SILT, brown, salurated with hydrocarbon, loose			10 10-12' CLAY, saturated, moderately dense	1-1-		 		1 1	-1-1		ST=Shelby Tube X SS=Split Spoon C=Cuttings



Project SUN: MARCUS HOOK REF. Owner SUN COMPANY INC. AST 522 Permit No. N/A Location ___ MW-78 Total Depth 20 feet Diameter 10 inches Well number __ Casing Elevation_ 12.70 feet Water Level: Initial 9 feet Static 4.88 feet 4 inches Length 15 feet Slot Size 0.02 inches Screen Dia. ___ 4 inches Length 5 feet Type Stainless Steel Casing Dia. ___ Drilling Method Hollow Stem Auger Sample Method grab cuttings flush mounted manhole Completion Details_

Driller B.L. MYERS BROS.. INC. Log By RDP Date 17 Sept. 1993



Depth (feet)	Sample No.	Well Const.	OVM (ppm)	Blow Count		Lithology
					ASPHALT A	AND BALLAST
		0 0	0		SAND	- Gray sand and gravel.
			130 288 100		SILT	- Dark gray, sandy silt, moist, strong odor Dark gray silt, wet, strong odor Light grayish/brown sandy silt, wet. Static Water Level 4.88 feet
			68		CLAY	- Grayish/brown clay, wet, moderate odor
-					ASPHALT/C	ONCRETE AND BALLAST
-			22		SAND	- Gray/brown silty sand Initial Water Level 9.0 feet
- 10 -					CLAY	- Gray, sandy clay, wet.
			15			- Gray, sandy clay, wet.
			2.0			- Gray clay, wet.
 - 20 -						END BORING 20 feet
						AOI-5

PAGE ____ OF ___



Project Sun Marcus Hook Refinery	Owner Sun Company, Inc. (R&M)				
Location Marcus Hook, PA	Permit NoN/A				
Boring number MW-83	Total Depth 19 ft. Diameter 10 inch				
Casing Elevation 20.26 ft	Water Level: Initial 13 ft Static 12.45 ft				
Screen Dia. 4-inch	Length15 ft Slot Size0.020 inch_				
Casing Dia. 4-inch	Length 4 ft Type PVC				
Drilling Method Hollow-Stem Auger	Sample MethodSplit-Spoon				
Completion Details Protective iron rise	r with locking lid				
Driller B. L. Myers Bros., Inc.	Log By E. Dziedzic Date 21 SEP 94				



Depth (feet)	Blow Count	Well Const.	OVM	Recovery (in.)	Lithology
			0.0		FILL - Brown sandy silt fill, crushed stone, dry
			31		- Black crushed stone and pea gravel, dry
5	2,2,3,2		65 217	10"	SILT - Black clayey silt, moist, odor - Grayish-brown clayey silt, moist
F∃					
			0.5	2011	
	4.6,8,14		97	20"	CLAY - Brown silty clay with matrix supported pebbles, NAPL, moist
H -					Static Water Level -12.45 ft
					Initial Water Level -13 ft - Rough augering
15	50/ 6"		446	2"	SAND - Coarse sand, poorly sorted, wet, odor,
Γ					rough augering - Rough augering
					- Rough augering
					- Auger refusal at 19 feet
					BORING COMPLETED AT 19 FEET
	1				, and the second
					.e.
- 25 -	1				1
					1
					1
30					



Project Sun Marcus Hook Refinery	Owner Sun Company, Inc. (R&M)				
Location Marcus Hook, PA	Permit No. N/	'A			
Boring number MW-84	Total Depth 8 ft.	Diameter 10 in			
Casing Elevation 10.16 ft	Water Level: Initial	<u>5 ft_Static_3.85 ft_</u>			
Screen Dia. 4-inch	Length 7 ft	Slot Size <u>0.020 inch</u>			
Casing Dia. 4-inch	Lengthlft.	Type_PVC			
Drilling Method Hollow-Stem Auger	Sample Method	Split-Spoon			
Completion Details, Protective iron riser	with locking lid				
Driller B. L. Myers Bros., Inc.	Log By E. Dziedzic	Date 21 Sep 94			

Sketch Map	
See attached site plan	

Depth	Blow	Well			
(feet)	Count	Const.	OVM	Recovery (in.)	
			0.0 127		FILL - Ballast stone CLAY - Gray micaceous silty clay, moist
 - 5 -	9,10,25,19		99	14"	Static Water Level -3.85 ft Value Level - 5 ft Gray silty clay, moist (top) SAND - Brown medium sand with pebbles, wet
					- Rough augering - Auger refusal at 8 feet
 - 10 -					BORING COMPLETED AT 8 FEET
 - 15 -					
 - 20 -					
 - 25 -					
					34C)



Project Sun Marcus Hook Refinery Owner Sun Company, Inc. (R&M) Location Marcus Hook, PA Permit No. N/A Boring number MW-85 Total Depth 8 ft. Diameter 10 inch Casing Elevation 11.98 ft Water Level: Initial 4 ft Static 5.74 ft Screen Dia. 4-inch Length 7 ft Slot Size 0.020 inch Casing Dia. 4-inch Length 1 ft Type PVC Drilling Method Hollow-Stem Auger Sample Method Split-Spoon Completion Details Protective iron riser with locking cap

Driller B. L. Myers Bros., Inc. Log By E. Dziedzic Date 21 SEP 94

Sketch Map	
See attached site plan	

Depth (feet)	Blow Count	Well Const.	OVM	Recovery (in.)	Lithology
	2,3,4,11		0.0 106 196 10	10"	TOP SOIL SILT - Brown clayey micaceous silt, dry - Dark brown-black clayey silt, moist Initial Water Level -4 ft - Black clayey silt, wet, odor - Gray silt Static Water Level -5.74 ft BORING COMPLETED AT 8 FEET
					BORING COMPLETED AT 8 PERT
30					



Project Sun Marcus Hook Refinery Owner Sun Company, Inc. (R&M) Location Marcus Hook, PA Permit No. N/A Boring number MW-86 Total Depth 18 ft. Diameter 10 inch Casing Elevation 14.68 ft Water Level: Initial 10 ft Static 2.09 ft Screen Dia. 4-inch Length 16 ft Slot Size 0.020 inch Casing Dia. 4-inch Length 2 ft Type PVC Drilling Method Hollow-Stem Auger Sample Method Split-Spoon Completion Details Protective iron riser with locking lid

Driller B. L. Myers Bros., Inc. Log By E. Dziedzic Date 21 SEP 94

Sketch Map	
See attached site plan	

Depth (feet)	Blow Count	Well Const.	OVM	Recovery (in.)	Lithology
			0.0		TOP SOIL - Ballast stone, wet, standing water with sheen Static Water Level- 2.09 ft CLAY - Brown clay, dry
- 5 - - 5 -	9,9,11,23		0.0	7"	- Brown micaceous clay, dry, some small well-rounded pebbles
	8,4,3,4		0.0	6"	Initial Water Level -10 ft SAND - Coarse sand with small well-rounded pebbles, some fines, wet 2" saprolitic clay at bottom
— — — 15 —	14,13,14,19		28		- Running sands, wet
	35/6"		17	3"	- Auger resistance-saprolite BORING COMPLETED AT 18 FEET
- 20 - - - -					
 - 25 - 					
30					

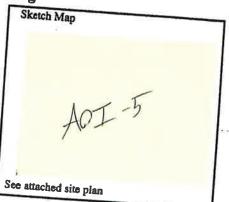
MW-109



Groundwater & Environmental Services, Inc.

Project Sun Marcus Hook Refinery Owner_Sun Company, Inc. (R&M) Location_ Marcus Hook, PA Permit No. . Boring number_ SB-1/MW-109 Total Depth_16 FT. Diameter 10 in.. Casing Elevation_ 15.32 ft. Water Level: Initial 10 ft. Static 5.67 ft. Screen Dia. 4 in. Length_ 4 ft Slot Size 0.020 in. Casing Dia. 4 in. Length_ 12 ft. Турс_ Drilling Method Hollow Stem Auger Sample Method . Split-Spoon Completion Details. Protective stick up riser pipe with locking lic Driller Lutz Environmental Log By L. Leitzel Date 10 June 1995

Drilling Log Sketch Ma



Depth (feet) Blow Count Const.	OVM	Recovery (in.)	Lithology
 			FILL - No. 2 gravel and fill stone
5 - 2-2-2-9	365 65	0	CLAY - Gray clay, with some brown silt, moist, strong odors Static water at 5.67 feet
			- Cobbles, no recovery
1 22 44	,400	- L	Initial water at 10 feet - Gray clay, moist, NAPL staining on the outside of the core, strong odors - Gray medium
50/2"	8 2		- Gray medium grained sand, hard, moist to wet, strong odors - Gray medium grained sand, wet, strong odors - Schist at 16 feet
	7. <u>.</u>		BORING COMPLETED AT 16 FEET
20 —			
25 —			
1			
, -			

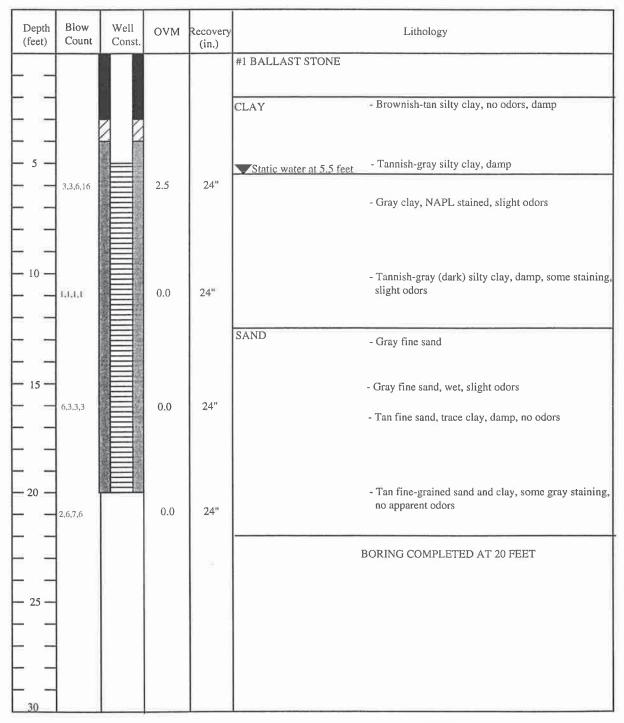


Driller Lutz Environmental

Project Sun Marcus Hook Refinery Owner Sun Company, Inc. (R&M) Phillips Island Location _ Permit No. __ Boring number SB-3/ MW-[13 Total Depth 20 ft. Diameter 10 in.. Casing Elevation___11.46_ Water Level: Initial ____Static _5.5 ft 4-inch Length 15 ft Slot Size 0.020 inch Screen Dia. __ 4-inch Length 5 ft Type PVC Casing Dia.___ Drilling Method Hollow Stem Auger Sample Method Split-Spoon Completion Details Protective Iron Riser with Locking Lid

Drilling Log

Sketch Map
See attached site plan



Log By L. Leitzel Date 10 May 95

PAGE 1 OF 1



Project Sun Marcus Hook Refinery Owner Sun Company, Inc. (R&M)

Location Phillips Island Permit No. N/A

Boring number SB-2/MW-114 Total Depth 20 ft. Diameter 10 in..

Casing Elevation 10.04 Water Level: Initial 15 ft. Static 9 ft

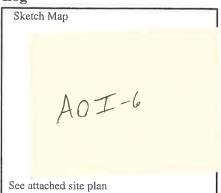
Screen Dia. 4-inch Length 15 ft. Slot Size 0.020 inch

Casing Dia. 4-inch Length 5 ft. Type PVC

Drilling Method Hollow Stem Auger Sample Method Split-Spoon

Completion Details Protective Iron Riser with Locking Lid

Driller Lutz Environmental Log By L. Leitzel Date 10 May 95



				I	
Depth (feet)	Blow Count	Well Const.	OVM	Recovery (in.)	Lithology
					BALLAST STONE
		i į			
		ij ij			CLAY - Brown silty clay
					- Gray silty clay, damp, no odors
F -					
- 5 -					- Tan clay with fine sand, moist
	3,4,5,6		7.6	24"	- Medium gray clay, trace silt, damp, some staining,
					slight odors
					SILT Static water at 9 feet - Tan clayey silt
- 10 -			0.0	24"	- Tannish-gray clayey silt, damp, no odors
	2,2,2,4		0.0	24	
H -					
15					✓ Initial water at 15 feet CLAY - Tannish-gray clay, wet, no odors, some staining
-	2,4,3,3		0.0	22"	
					- Tan micaceous clay, trace of fine sand, no odors
- 20 -					
1 1	5,8,9,12		2.5	22"	- Tan micaceous clay, wet, no odors
					<u> </u>
					BORING COMPLETED AT 20 FEET
_ 25 _					
30					
20					



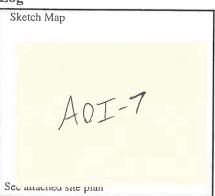
Project Sun: Marcus Hook Refinery Owner Sun Company, Inc. (R&M) Location Phillips Island Permit No. N/A Boring number SB-9 /MW-115 Total Depth 30 ft. Diameter 10 in.. Casing Elevation 20,31 Water Level: Initial 14 ft Static 26 ft Screen Dia. 4-inch Length 25 ft. Slot Size 0.020 inch Casing Dia. 4-inch Length 5 ft. Type PVC Drilling Method Hollow Stem Auger Sample Method Split-Spoon Completion Details Protective Iron Riser with Locking Lid Driller Lutz Environmental Log By RDP Date 25 June 95



Depth (feet)	Blow Count	Well Const.	OVM	Recovery (in.)		Lithology
					SAND	- Brown silty sand, no odors, moist
 - 5 -					CLAY	- Gray silty clay, some sand, no odors, moist
	8.7,6,6		0.0	12"	SILT	- Brown gray sandy silt with pebbles, no odors, moist
- 10 -					CLAY	- Gray silty clay, some pebbles, moist, no odors
	8,8,6,7		0.0	15"		- Some dark gray sandy silt at bottom of sample
- 15 -			0.0		✓ Initial water at 14 feet	- Dark gray silty clay, wet, no odors
_ 20 _	18,16,22,26		0.0	3"		- Gray silty clay with some sand, wet, no odors
- 25 - 					Static water at 26 feet	
30					BOR	RING COMPLETED AT 30 FEET



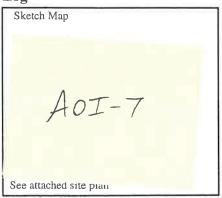
Project Sun: Marcus Hook Refinery Owner Sun Company, Inc. (R&M) Location Phillips Island Permit No. N/A Boring number SB-8/MW-116 Total Depth 30 ft. Diameter 10 in.. Casing Elevation 21.38 Water Level: Initial 16 ft Static 30 ft Screen Dia. 4-inch Length 25 ft Slot Size 0.020 inch Casing Dia. 4-inch Length 5 ft Type PVC Drilling Method Hollow Stem Auger Sample Method Split-Spoon Completion Details Protective Iron Riser with Locking Lid Driller Lutz Environmental Log By RDP Date 25 June 95



Depth (feet)	Blow Count	Well Const.	OVM	Recovery (in.)	Lithology
					SILT - Brown silt and sand
_ =					CLAY - Gray silty clay
- 5 - - 5 - 	6.7,9,8		0.0	12"	- Dark gray silt clay, some sand, wet, no odors
10 —	8.12.15,18		4.5 0.0	12"	 - Gray brown sily clay, some sand, wet, no odors - Dark gray silty clay (no sand), moist, no odors - Dark gray silty clay (piece of brick), moist, no odors - Dark gray silty clay, moist, no odors
15 —	8,8,11,13		0.0	12"	✓ Initial water at 16 feet SILT - Dark gray silt, some sand, no odors, wet
- 20 - - 20 -			20 4.5	0	- Gray silt with pebbles, wet, slight odor - Water, no recovery
25 —					
30					BORING COMPLETED AT 30 FEET Static water at 30 feet



Project Sun: Marcus Hook Refinery Owner Sun Company, Inc. (R&M) Location Phillips Island Permit No. N/A Boring number SB-4/ MW-117 Total Depth 30 ft. Diameter 10 in.. Casing Elevation 22.69 Water Level: Initial Static 10 ft Screen Dia. 4-inch Length 25 ft Slot Size 0.020 inch Casing Dia. 4-inch Length 5 ft Type PVC Drilling Method Hollow Stem Auger Sample Method Split-Spoon Completion Details Protective Iron Riser with Locking Lid Driller Lutz Environmental Log By L. Leitzel Date 12 May 95



Depth (feet)	Blow Count	Well Const.	OVM	Recovery (in.)		Lithology
					SILT	- Medium brown silt, some cobbles, some fill, no odors, moist
		2 2			CLAY	- Gray silty clay, damp, no odors
_ 5 _					1	- Tan-gray silty clay, moist, no odors
	3,3,6,16		2.2	24"		- Gray clay, trace silt, damp, slight odors
					ı	
10					Static water at 10 feet	
	2,3,4,4		33	19"		- Dark gray clay, trace silt, damp, slight odors
15 —	3,4,6,6		6.6	24"		- Medium gray silty clay, some tan clay, damp, slight
	5,40,0		0.0	-		petroleum odors
- 20 -	2224		6.6	24"		
	3,3,3,4		0.0	2-		- Medium gray silty clay, trace tan clay, damp, slight petroleum odors, trace of coal
						- Some light NAPL on augers when extracted
						from boring.
— 25 —						
					В	ORING COMPLETED AT 30 FEET
30						



Driller Lutz Environmental

Project Sun: Marcus Hook Refinery Owner Sun Company, Inc. (R&M) Phillips Island Permit No. __ Location _ Total Depth 30 ft. Diameter 10 in.. MW-121 Boring number Casing Elevation___17.27 Water Level: Initial 17 ft_Static 14 ft. 4-inch Length 20 ft Slot Size 0.020 inch Screen Dia._ Length 10 ft Type PVC Casing Dia. 4-inch Drilling Method Hollow Stem Auger Sample Method Split-Spoon Completion Details Protective Iron Riser with Locking Lid

Log By RDP

Drilling Log

Sketch Map	
See attached site plan	

Depth (feet)	Blow Count	Well Const.	OVM	Recovery (in.)	
					FILL - Brown silty clay with rocks & pebbles, dry
			0		SILT - Gray sandy silt with pebbles
					- Gray silt with pebbles, moist
- 5 -			0		
			0		CLAY - Brown silty clay, no odor, moist
			0		- Gray silty clay, no odor, moist
			0		- Dark gray silty clay (little sand), no odor, moist
- 10 -					
			71		- Dark gray silty clay (little sand), slight odor, mois
			105		- Dark gray silty clay (little sand), odor, moist
			94		Static adjusted water level at 14.18 fee
— 15 —					
			31		SILT - Dark gray silt, moist, odor Initial water at 17 feet
			21		- Dark gray silt, wet, NAPL
	10,4,5,12		52		
— 20 —			42 73	0	
	7,5,7,6		178	6"	
	1566			12"	CLAY - Dark gray silty clay, strong odor, NAPL
	4,5,6,6		31	12	- Gray silty clay, по NAPL, slight odor
25			0	24"	- Gray clay with a little silt, no odor, wet
25	5,3,3,7		0	24	- Glay Glay Will a Hillo Shi, No Goot, Wot
	2,3,3,5			24"	
	2,3,3,3		0	24	
			0		
30			0		BORING COMPLETED AT 30 FEET

Date_11 Sept 95

PAGE __I OF __I



Project	Sun Marcus Hook Refinery	Owner	Sun Com	pany, Inc. R&	М
Location	Marcus Hook, PA	Permit No.	NA		
Well number	MW-129	Total Depth	20 feet	Diameter	10.25 inch
Casing Elevation	12.04 feet	Water Level:	Initial 4	feet Static	6.91 feet
Screen Dia.	4 inch	Length 17 f	feet	Slot Size 0.0	20 inches
Casing Dia.	4 inch	Length 3 f	eet	Type PVC so	olid riser
Drilling Method	Auger	Sample Meth	nod Spli	it-spoon/Drill (Cuttings
Completion Deta	ils Flush-mount bolted cove	er with lockin	g cap		
Driller	B.L. Myers Bros., Inc.	Log By M.	D.W.	DateMarcl	h 11, 1996

Sketch Map
SEE GENERALIZED SITE PLAN
×

Depth Sample (feet) No.	Well Const.	OVM ppm.	Blow Count	Lithology
	Const.	2.4 15 0 1 15 478 641 27.9 154 641 16.5 105	6,8,5,50 5,12,5,11 6,8,12,8	ASPHALT: -Limestone ballast below road CLAY: -Dark gray sandy clay, moist -Tan-white clay, wet, no odor -Tan clay with gray sandy silt, moist, no odor -Gray sandy clay, moist, no odor -Gray clay, wet, no odor -Same -Gray clay, wet (small amount of NAPL at end of spoon) -Same -Gray clay, wet, with odor -Dark gray clay, wet, no odor -Same Boring completed at 20.0 feet



ProjectSi	un Marcus Hook Refinery	Owner	Sun Company, Inc. R&M
LocationN	larcus Hook, PA	Permit No.	NA
			17.80 feet Diameter 10.25 inc
Casing Elevation	11.38 feet	Water Level	l: Initial 8 feet Static 11.2 feet
Screen Dia.	4 inch	Length15	feet Slot Size 0.020 inches
Casing Dia.	4 inch	Length 2.8	Type PVC solid riser
Drilling Method	Auger	Sample Meth	hod Split-spoon/Drill Cuttings
Completion Details	Flush-mount bolted cover	er with lockin	ng cap
Driller	B.L. Myers Bros., Inc.	Log By M.	.D.W. Date March 22, 1996

	Sketch Map
	SEE GENERALIZED SITE PLAN
1	

Depth Sample (feet) No.	Well Const.	OVM ppm.	Blow Count	Lithology
		29 3.5	6,7,6,7 2,3,5,5 3,5,7,7	ASPHALT: Water in ballast just under asphalt CLAY: -Gray-brown clay with sand, moist -Gray silty clay with gravel, moist -Hard flakes of schist -Brown-gray silty clay, wet -Purple clay with gravel, dry, no odor Initial water level at 8.0 feet. -Gray silty clay, slightly purple, wet -Purple-crimson sandy clay, wet, odor and some NAPL Static water level at 11.2 feet -Gray-purple silty clay with some gravel, wet -Same -Gray silty clay, wet, no odor -Gray clay, wet, no odor Boring completed at 17.80 feet

Groundwater & Environmental Services, Inc.

Drilling Log



Project	Sun Marcus Hook Refinery	Owner	Sun Com	pany, Inc.	R&M
Location	Marcus Hook, PA	Permit No.	NA		
Well number	MW-131	Total Depth	20 feet	Diamet	er 10.25 inch
Casing Elevation	11.67 feet	Water Level	: Initial <u>15</u>	feet S	tatic 5.37 feet
Screen Dia.	4 inch	Length15	feet	Slot Size	<u>0.020 inches</u>
Casing Dia.	4 inch	Length 5 f	eet	Type_PVC	Solid riser
Drilling Method	Auger	Sample Meth	nod <u>Spli</u>	it-spoon/Dr	ill Cuttings
Completion Deta	Title of the second to the dead were	er with lockin	g cap		
Driller	B.L. Myers Bros., Inc.	Log By M.	D.W.	DateM	arch 22 1996

Sketch Map
SEE GENERALIZED SITE PLAN

Depth (feet)	Sample No.	Well Const.	OVM ppm.	Blow Count	Lithology
					CONCRETE:
	1				-Blacktop 0-6 inches underlain by ballast, no odor
			13		CLAY: -Brown silty clay with gravel, slight odor
			161		-Same, small rock fragments, dry, slight odor
_ 5 _			40	2,3,2,5	-Light gray clay with rock fragments, moist Static water level at 5.37 feet
-					
F -					-Darkbrown to gray silty clay, moist, no odot
<u> </u>			12	8,8,8,9	- Dark gray fabric like material, moist, no odo:
<u> </u>			8		-Dark gray silty clay
_ 15 _					-Same color, more clay and slight odor, wet at 15 ft
-			2.6	3,3,5,7	- Organic material mixed with silty clay, wet, NAPL at 15 ft
			18		-Brownish-black clay, wet
_ 20 _			3		-Same
					Boring completed at 20 feet
-					
F -					

PAGE OF 1

Groundwater & Environmental Services, Inc.

Drilling Log



Project	Sun Marcus Hook Refinery	Owner	Sun Com	pany, Inc.R&	:M
Location	Marcus Hook, PA	Permit No.	NA		
Well number	MW-132	Total Depth	18.3 feet	Diameter	10.25 inch
Casing Elevation		Water Level:	: Initial	Stati	ic 6.27 feet
Screen Dia.	4 inch	Length15	feet	Slot Size 0	.020 inches
Casing Dia.	4 inch	Length 3.3	feet	Type_PVC s	olid riser
Drilling Method	Auger	Sample Meth	nod Spli	t-spoon/Drill	Cuttings
Completion Detai	ls Flush-mount bolted cover	er with lockin	g cap		
Driller	B.L. Myers Bros., Inc.	Log By_M.	D.W	Date Marc	ch 25, 1996

	Sketch Map
i.	SEE GENERALIZED SITE PLAN

Depth San (feet) No	ell onst.	OVM ppm.	Blow Count	Lithology
		0.0		CONCRETE:
	7	0.2		-Blacktop 0-6 inches underlain by ballast, no odor
		4.9		SOIL:
	_			-Black sandy soil with small pebbles, dry, no odor.
				CLAY:
				-Dark brown-black silty clay, dry
			6,50+	-Black silty clay, dry, no odor
				-Moist black clay, plastic, dry, no odor
				-Moist black clay, plastic, dry, no odor -Gray slightly silty clay, plastic, wet Initial water level at 9 feet
_ 10 _		3.1	4,5,3,7	Sand layer at 10.5 ft. clay above and below, wet, no odoi
				-Black silty clay, moist
<u> </u>				-Sandy dark brown clay with some organics, wet, no odor
— 15 — — —			2,2,3,5	-Dark brown clay with some organic material, wet, no odor
				-Black sandy clay
				-Greenish brown clay, wet, slight odor
= =				Boring completed at 18.3 feet
20 —	- 10			
- -				
\vdash \dashv		3		
= =				

PAGE $\stackrel{1}{---}$ OF $\stackrel{1}{---}$

Groundwater & Environmental Services, Inc.

Drilling Log



Project Sun Marcus Hook Refinery	Owner Sun Company, Inc.	Sketch Map
Location Marcus Hook, PA	Permit No. NA	SEE GENERALIZED
Well number <u>MW-133</u>	Total Depth 18 ft. Diameter 10.25 inch	
Casing Elevation 15.26 feet	Water Level: Initial 11.5 feet Static 9.06 feet	
Screen Dia. 4 inch	Length 15 Slot Size 0.020 inches	
Casing Dia. 4 inch	Length 3 ft. Type PVC solid riser	
Drilling Method Auger	Sample Method Split-spoon/Drill Cuttings	
Completion Details Flush-mount bolted cov	er with locking cap	
Driller B.L. Myers Bros., Inc.	Log By M.D.W. Date March 25, 1996	

N.	etch Map				
1	GENERA	ALIZED	SITE PLA	AN	

Depth Samp (feet) No.	e Well Const.	OVM ppm.	Blow Count	Lithology
			3,2,2,4	CLAY: -Dark gray plastic clay, moist, no odor -Brownish gray sandy clay, wet -Gray sandy-silty clay, wet -Poor spoon recovery of 2 inches, gray black clay moist -Gray wet clay no odor -Wet, sandy gray clay with small pebbles Initial water level at 11.5 feet -Poor spoon recovery of 3 inches, mostly water; gray clay with a slight sheen, little odor -Gray wet clay with some small pebbles -Same, less pebbly -Greenish-gray clay, very wet, -Reddish gray clay, wet, plastic Boring completed at 18.0 ft.

PAGE $\frac{1}{-}$ OF $\frac{1}{-}$



Boring Location: Phillips Island

Project: Phase II

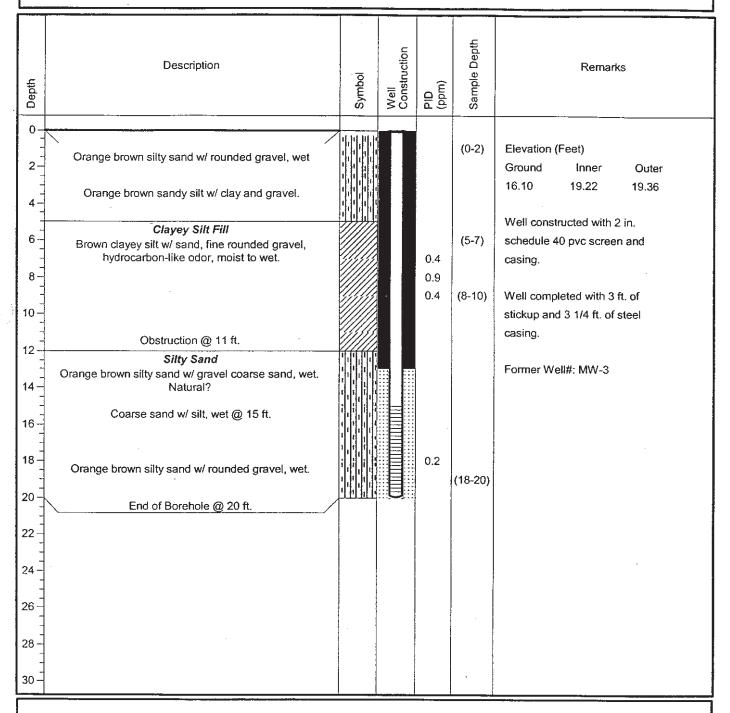
Client: FPLE/Sunoco

Date: March 16, 2000

Project No: 25995-046

Site Address: Marcus Hook, PA

Field Personnel: Neil Laird



Start Date: Feb. 9, 2000

Drilled By: Tri State Env. Mngmt. Services, Inc.

Hole Size: 6 1/4

Finish Date: Feb. 10, 2000

Drill Method: Hollow Stem Auger



Project: Phase II

Monitoring Well #: MW-138

Boring Location: Phillips Island

Client: FPLE/Sunoco

Date: March 16, 2000

Project No: 25995-046

Site Address: Marcus Hook, PA

Field Personnel: Neil Laird

Depth	Description	Symbol	Well Construction	PID (ppm)	Sample Depth	Remarks
0-						***
2-					(0-2)	Elevation (Feet) Ground Inner Outer
-	Silty Clay Fill Medium brown silty clay w/ sand and aggregates.					Ground Inner Outer 16.94 20.01 20.17
4-	, , , , ,			0.5		
6-	Some black staining present @ 5 ft.					Well constructed with 2 in. schedule 40 pvc screen and casing.
8-	Some tar-like material present @ 8 ft.					
10-				0.7	(8-10)	Well completed with 3 ft. of stickup and 3 ft. of steel casing.
12-				4.2	(12-14)	Former Well #: MW-4
14~	Moist to wet.		-	4.2	(12-14)	1
16	· .					
18-	Sandy Silt Fill Orange brown sandy silt w/ rounded gravel, wet.			0.9		
20 -	Orange brown sandy silt /w rounded gravel, wet.					
22 -	Brown sand w/ silt and fine gravel, wet.					
				1.1		ļ
24 –	Silty Sand Fill				(23-25)	
26 –	gravel, wet.					
28	End of Borehole @ 25 ft.	:			·	
30 -	· ·					`

Start Date: Feb. 14, 2000

Drilled By: Tri State Env. Mngmt. Services, Inc.

Hole Size: 6 1/4 in.

Finish Date: Feb. 14, 2000

Drill Method: Hollow Stem Auger



Boring Location: Phillips Island

Project: Phase II

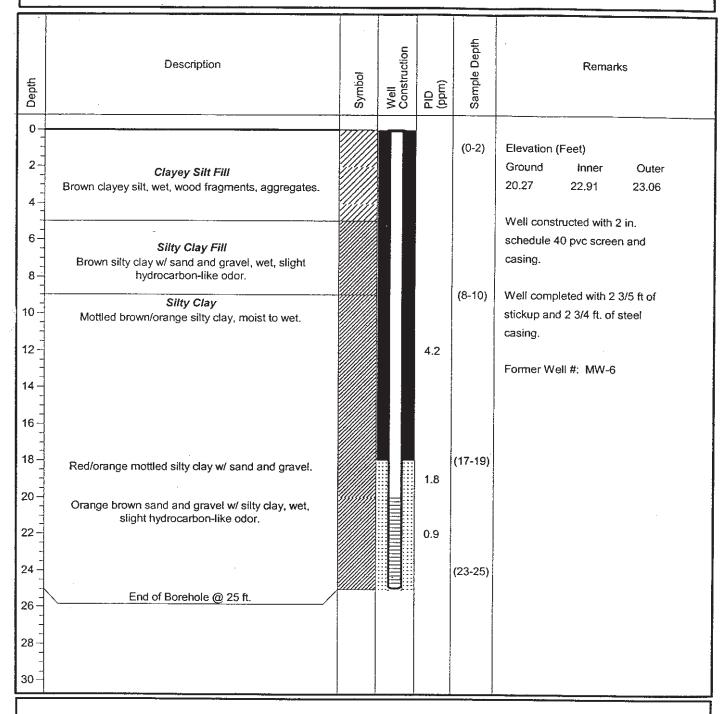
Client: FPLE/Sunoco

Date: March 16, 2000

Project No: 25995-046

Site Address: Marcus Hook, PA

Field Personnel: Neil Laird



Start Date: Feb. 10, 2000

Drilled By: Tri State Env. Mngmt. Services, Inc.

Hole Size: 6 1/4

Finish Date: Feb. 10, 2000

Drill Method: Hollow Stem Auger



Boring Location: Phillips Island

Project: Phase II

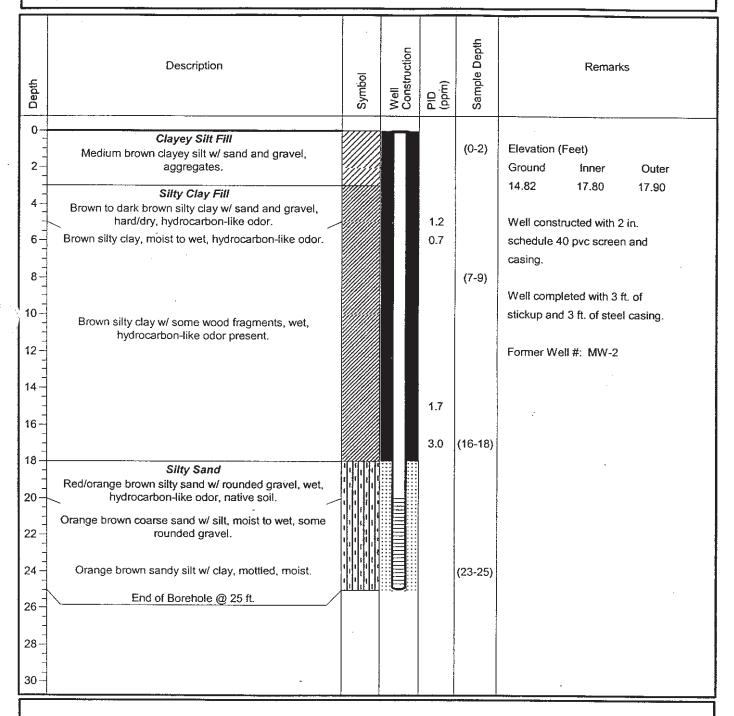
Client: FPLE/Sunoco

Date: March 16, 2000

Project No: 25995-046

Site Address: Marcus Hook, PA

Field Personnel: Neil Laird



Start Date: Feb. 9, 2000

Drilled By: Tri State Env. Mngmt. Services, Inc.

Hole Size: 6 1/4 in.

Finish Date: Feb. 9, 2000

Drill Method: Hollow Stem Auger



Boring Location: Phillips Island

Project: Phase II

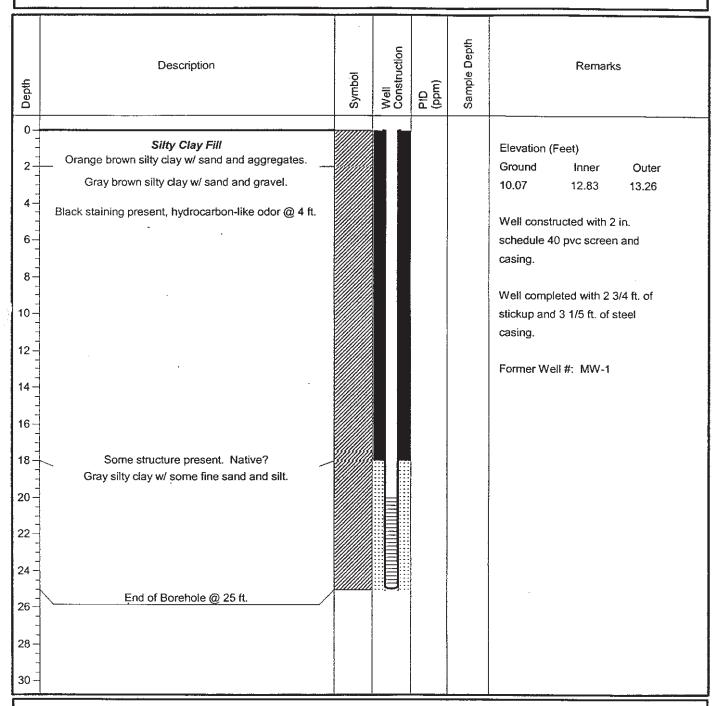
Client: FPLE/Sunoco

Date: March 16, 2000

Project No: 25995-046

Site Address: Marcus Hook, PA

Field Personnel: Neil Laird



Start Date: Feb. 16, 2000

Drilled By: Tri State Env. Mngmt. Services, Inc.

Hole Size: 6 1/4 in.

Finish Date: Feb. 16, 2000

Drill Method: Hollow Stem Auger



Boring Location: Phillips Island

Project: Phase II

Client: FPLE/Sunoco

Date: March 17, 2000

Project No: 25995-046

Site Address: Marcus Hook, PA

Field Personnel: Neil Laird

Depth	Description	Symbol	Well Construction	(mdd)	Sample Depth	Remarks
0 - 2 - 4 - 6 - 8 - 10 - 12 - 14 - 16 - 18 - 20 - 24 - 26 - 28 - 30 - 32 - 34 - 36 - 38 - 40 - 42 - 44 - 46 - 48 - 50 - 52 - 54 - 10 - 10 - 10 - 10 - 10 - 10 - 10 - 1	odor, moist, medium compaction, high plasticity. Oity residue (staining). Olive green to dark gray silty clay, hydrocarbon-like odor, residue, very moist, medium compaction, high plasticity. Yellowish orange staining, wood and brick fragments. Olive green to dark gray silty clay, hydrocarbon-like odor, residue, brick fragments, very moist, medium compaction, high plasticity. Olive green to dark gray silty clay, brick fragments, hydrocarbon-like odor, very moist, medium compaction, high plasticity. Olive green to dark gray silty clay w/ some gravel, hydrocarbon-like odor, residue, moist, medium compaction, high plasticity. No Recovery. Silty Clay Fill Olive green to dark gray silty clay, hydrocarbon-like odor, residue, very moist to wet, medium compaction, high plasticity.					Elevation (Feet) Ground Inner Outer 22.18 24.78 25.29 Well constructed with 2 in. schedule 40 pvc screen and casing. Well completed with 2 1/2 ft. of stickup and 3 ft. of steel casing. Former Well #: MW-11 Lithology and PID readings from nearby GP-PH4.

Start Date: Feb. 15, 2000

Drilled By: Tri State Env. Mngmt. Services, Inc.

Hole Size: 6 1/4 in.

Finish Date; Feb. 15, 2000

Drill Method: Hollow Stem Auger



Boring Location: Phillips Island

Project: Phase II

Client: FPLE/Sunoco

Date: March 17, 2000

Project No: 25995-046

Site Address: Marcus Hook, PA

Field Personnel: Neil Laird

Depth	Description	Symbol	Well Construction	Old (mdd)	Sample Depth	Remarks
0 - 2 - 4 - 6 - 8 - 10 - 12 - 14 - 16 - 18 - 22 - 24 - 26 - 33 - 34 - 36 - 38 - 40 - 44 - 46 - 48 - 50 - 52 - 54 - 10 - 10 - 10 - 10 - 10 - 10 - 10 - 1				2.9	(13 for VOC's)	Elevation (Feet) Ground Inner Outer 23.32 26.18 26.02 Well constructed with 2 in. schedule 40 pvc screen and casing. Well completed with 2 4/5 ft. of stickup and 2 3/4 ft. of steel casing. Former Well #: MW-9 Lithology and PID readings taken from GP-PH3, which is located nearby.

Start Date: Feb 14, 2000

Drilled By: Tri State Env. Mngmt. Services, Inc.

Hole Size: 6 1/4 in.

Finish Date: Feb. 14, 2000

Drill Method: Hollow Stem Auger



Boring Location: Phillips Island

Project: Phase II

Client: FPLE/Sunoco

Date: March 17, 2000

Project No: 25995-046

Site Address: Marcus Hook, PA

Field Personnel: Neil Laird

Depth	Description	Symbol	Well Construction	Old (mdd)	Sample Depth	Remarks
0- 2- 4- 6- 8- 10- 12- 14- 16- 18- 20- 22- 24- 26- 28- 30- 32- 34- 36- 38- 40- 42- 44- 46- 48- 50- 52- 54-	hydrocarbon-like odor, moist. Gray to dark gray silty clay w/ sand, gravel, hydrocarbon-like odor, some residue, moist, tightly compacted, high plasticity. Silty Sand Fill Yellowish brown to gray silty sand w/ gravel, hydrocarbon-like odor, moist, loosely compacted, medium plasticity, white waxy material present. Silty Clay Fill Dark gray to black silty clay w/ gravel and cobble, hydrocarbon-like odor, some residue, moist, medium compaction, medium plasticity, concrete fragments present. Olive green to dark gray silty clay w/ some sand and gravel, hydrocarbon-like odor, some residue, moist, medium compaction, high plasticity. Dark gray to black silty clay w/ sand and gravel, hydrocarbon-like odor, some residue, moist, medium compaction, high plasticity Olive green to dark gray silty clay w/ some gravel, hydrocarbon-like odor, some residue, moist, loosely compacted, high plasticity. Dark gray to black silty clay w/ gravel, hydrocarbon-like odor, residue, fairly moist, medilum compacted, high plasticity No lithological description from 32 ft. down.					Elevation (Feet) Ground Inner Outer 22.36 24.91 25.06 Well constructed with 2 in. schedule 40 pvc screen and casing. Well completed with 2 1/2 ft. of stickup and 2 3/4 ft. of steel casing. Former Well #: MW-8 Lithology, and PID readings taken from GP-PH2, which is located nearby.

Start Date: Feb. 15, 2000

Drilled By: Tri State Env. Mngmt. Services, Inc.

Hole Size: 6 1/4 in.

Finish Date: Feb. 15, 2000

Drill Method: Hollow Stem Auger



Boring Location: Phillips Island

Project: Phase II

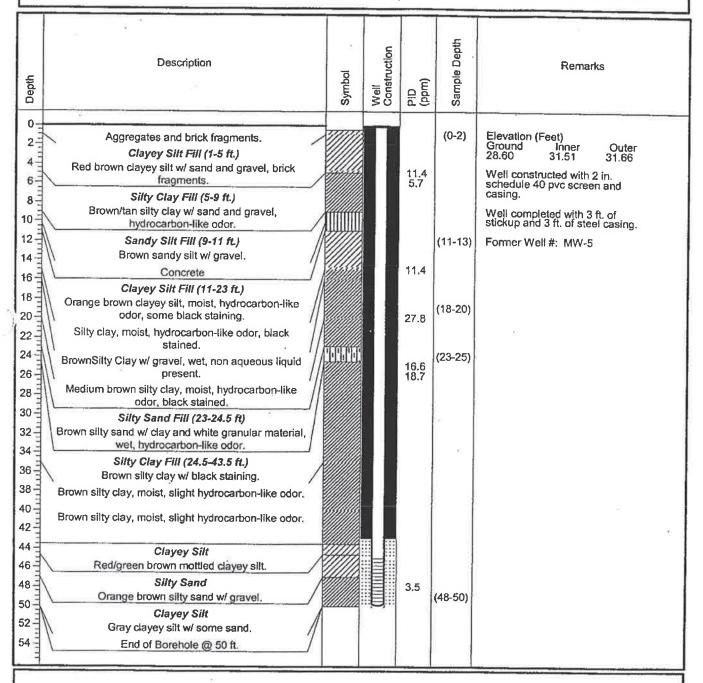
Client: FPLE/Sunoco

Date: March 16, 2000

Project No: 25995-046

Site Address: Marcus Hook, PA

Field Personnel: Neil Laird



Start Date: Feb. 11, 2000

Drilled By: Tri State Env. Mngmt. Services, Inc.

Hole Size: 6 1/4

Finish Date: Feb. 11, 2000

Drill Method: Hollow Stem Auger



WELL LOG: MW-188

-	Hand Permit #:	ex of Ma		1			-		G: N	1W-18	3			
_		1		<i>a</i>		Irill Date:	July	25, 2002	Use	Monitoria				
To	Location: Owner: <i>Su</i>	noca I	or (pare	nnery	Marcu	IS Hook, P.	A.		Owner	Monitoring Well				
	Owner Add	ress:	Telauses	Au= =					Handey	Owner Loc #: Middle Creek Handex Loc #: 110535				
	Prilling Met	hod: H	OHOW-AL-	ave. E	Green	St.		BORING - Dep	th: 20 ft					
s	ampling Me	ethod:	(none)	II AUG	<i>er</i>			CASING - Leng	th: 0.5 ft					
s	tatic Wate	r Level	: A ft	-				SCREEN - Leng	th: 15 ft.					
- 1			T					WELL — Dep	th: 20 ft.	Dlameter:	4 in.			
Denth (se)	Sample ID	Sample Depth	Blows/6 in.	OVA (ppm)	Graphic Log			ologic Descriptio	n	Well Dia Protective Casing 1 PVC	gram			
20-	t: Wayne	Zimmerl		*Ge of w	eologic di	*Tan Silty Olive-gray 9 Organic mat	CLAY Silty Clerial	om the GES Drilling L February I, 1993, fo	e	4" Sched. 40 PVC (0.020 slat)	Bentonite Seal			
							Drille	er: Handex of Ne	W Jersev					



	Local Owner Owner Drilling Samp	Hand nit #: ation: er: Su er Addi ng Meth	ex of (non Marconoco ress: nod:		efinery A) Ave. E em Aug	, Marci	Orill Date: U s Hook, P A			Use: Owner L Handex 1: 25 ft. 1: 5 ft.	Monitoring Well oc #: Middle Creek Loc #: 110535 Diameter: 11.5 in. Diameter: 4 in. Diameter: 4 in.
-	Depth (ft.)	Sample 1	Sample De	Blows/6 II	OVA (ppm)	Graphic Log		Ge	ologic Description		Well Diagram Top of casing
20-			1/2,1,	4,4,5,8 2,2,2,2 1,1,1,1 1,2,1 72,1,2	*Gi	eologic d	*Tan Slity Olive-gray Organic mate	CLAY Slity (erial	CLAY, saft, malst, trace om the GES Orining Log February 1, 1993, for ation for the first ten	-20	#! Morle Well Grave; A
								וווויט	er: Handex of New	Jersev	



WELL LOG: MW-190

Handex of Maryland	WEL	L LOG	: MW	-100	
Permit #: (none)				190	•
Location: Marcus Hook Refil	Drill Date: July	25, 2002	Use: Monte	toring Woll	
Owner: Sunoco Inc. (RSM)	HOOK, PA.		Owner Loc #:	Middle Con-	4.
Owner Address: Delaware A	VO R Groom St		Handex Loc #	MAGIE LIPE	K
Drilling Method: Hollow-stem	Augor	BORING - Depth:	· 20 ft.		
Sampling Method: Direct Pusi	h	CASING - Length:	5 ft.	Diameter:	
Static Water Level: 8 ft.		SCREEN - Length:	15 ft.	Diameter:	
		WELL - Depth:	20 ft.	Diameter:	4 in.
pth (O O A S *Dark-brown S	ologic Description	Top of c set .3 le below gra	et 1	am
5- 10- 20- 25- Geologist: W. Zimmerli	*Geologic description taken from the first of well number SB-3/VP-2 from reference, due to hydro excavaleet.	Om the GES Orilling Log February I, 1993, for ation for the first ten	25 57 54 Sched. 40 PVC (0.020 slot)	44" Sched. 40 PVC>	Marie Well Gravel Bentonite Seal Sand Cement Grout
	Urille	er: Handex of New J	ersev		-



WELL LOG: MW-192

Handex of Maryland Permit #: (none) Drill Date: July 25, 2002 Location: Marcus Hook Refinery, Marcus Hook, PA. Use: Monitoring Well Owner: Sunoco Inc. (RGM) Owner Loc #: Middle Creek Owner Address: Delaware Ave. @ Green St. Handex Loc #: 110535 BORING - Depth: 20 ft. Drilling Method: Hollow-stem Auger Diameter: 11.5 In. CASING - Length: 8.5 ft. Sampling Method: (none) Diameter: 4 in. SCREEN - Length: 15 ft. Static Water Level: 8 ft. Dlameter: 4 in. WELL - Depth: 20 ft. Depth Depth (ft.) .⊑ Log (mdd) Sample J Blows/6 ; Sample [Graphic Geologic Description Well Diagram Protective r PVC *Dark brown Silty SAND with subangular Stick-Up Pebbles & fill material *Tan Slity CLAY 1 10-4" Sched. 40 PVC (0.020 slot) Olive-gray Silty CLAY, soft, moist, trace Organic material 15-15 20--20 25-*Geologic description taken from the GES Orilling Log of well number SB-3/VP-2 from February 1, 1993, for reference, due to hydro excavation for the first ten

Geologist: Wayne Zimmerli

Driller: Handex of New Jersey

International Incorporated

SM See "Legend to sampling metho		Drilling Contra Parratt-Wo Inc. Boring Diam.(in.):	Iff, Marcu	Project Name: Sunoco, Inc. is Hook Refinery, PA Groundwater Depth (ft.):	Method/Equipt Hollow Stem A Split Spoo	Luger	1	ell Numb
classifications a testing methods	nd laboratory	4	Elev.(fl.):	Groundwater Depth (It.):	Total Depth (ft.): 20.0	Drive wt.(lbs.		Drop Dist (in.)
Well Construction	Depth, (ft.)	Sample Type		Description			Recover	PID Reading (
Bentonia	e	SAN	D, fine to coarse	e; little silt, little fine gravel,	prown, moist			
Seal #1 Sand	.	T AM CON	CRETE pieces				0.5	0.0
"A Saily	-			dium to coarse sand, gray, wo			0.6	0.0
Schedule PVC, 20	40 5—	SANE), fine; little med	lium to coarse sand, gray, we	t.		1	
	-	CLAY	' some silt to				1.8	0.0
	-	CLAY	AND SILT; tra	e fine to coarse sand, gray, dr ce fine to coarse sand, gray/d	y.		7	0.0
	-	1000					0.9	0.0
	-	SILT; I	ittle clay, little f	ine to coarse sand, trace fine	gravel, gray, dry.		0.4	0.0
	10—	SILT; I	ittle clay, little fi	ne to coarse sand, trace fine				
1					graver, gray, dry.		1.2	0.0
3		SILT: S	fine; oily, sticky	, moist.				0.0
.		SAND,	fine AND SILT;	, moist. ine to coarse sand, dark gray, little medium to coarse sand ine to coarse sand, dark gray	moist.		0.8	0.0 0.0
		CLAY;	some siit, little f	little medium to coarse sand ine to coarse sand, dark gray,	moist.	st.	d	0.0
	15-			sand, mule sift, dark grav.	moist		1.3	0.0
	1 1	CLAY; I	ittle fine to coars	se sand, little silt, dark gray/b	lack dry	- 1	1.5	0.0
	-		, come i	me to coarse sand, dark gray,	moist			0.0
	1 -	CLAY; tr	ace silt trace fir	e cond J. I			1.1	0.0
		KKKK	and Drift HWING HIL	e cand dad			- 1	0.0
Bottom Plug	20-	CLAY; lie	tle fine sand, tra	ce silt, dark gray/black, mois ce silt, dark gray, moist.	SL,		1.0	0.0
#1 Sand	20-							0.0
	-	1				ł		1
	4	1						- [
						1		
				d based upon visual/manual		1	- 1	1

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

'roject No. 62SU.01009.02

Date 2002

Log of Well

HILIPS ISLAND.GPJ OG OF BOREHOLE

Figure

(sheet 1 of 1)

International Incorporated

SM See "Legend to I sampling method		Parratt-V Inc.	Volff,	Project Name: Sunoco, Inc. cus Hook Refinery, PA	Method/Equips Hollow Stem A Split Spoo	Auger		ell Nur
classifications ar testing methods	d laboratory	Diam.(in.):	Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 20.0	Drive wt.(lbs.)		Droj Dist.(ii
Well Constructio	Depth, (ft.)	Sample Type		Description	20.0		Records	TEACHET)
Bentonit	e -	SA	ND, fine; little n	nedium to coarse sand, gray, m	loist.		11	
Seal Schedule PVC, 20	40 Slot			redium to coarse sand, trace fir		*	1.0	
#1 Sand	-	****					0.8	0
	5-	SIL:	I' little fine and	edium to coarse sand, trace fin		ray,	1.3	0.
			T AND SILI; II	ittle fine to coarse sand, black,		/	1.0	0.0
	10-	was o	observed. Tough	ttle fine to medium sand, black , a 0.2 foot section of tan, fibro drilling from 8.5 to 9.5 feet.	ous, asbestos-like ma	aterial	0.9	0.0
		SAN	D, fine; little med	tle fine to medium sand, black fium to coarse sand, little clay,	gray, moist.		1.0	0.0
	-		SILT, SOI	ne line to medium sand, gray,			0.4	0.0
	15-	CLAY	· little cité l'est-	fine to medium sand, gray, mo			1.0	0.0
Bottom Plug #1 Sand				and, dark gray, i	noist.			18.2 14.2
25. 25.	20—	CLAY;	little silt, little fi	ine to medium sand, gray/dark	gray/black, moist.		1.4	6.2
						\neg		
hstrata descrine		8		and based upon visual/manual				- 1

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

³rnject No. 62SU.01009.02

Date 2002

Log of Well

Figure

HILIPS ISLAND GPJ OG OF BOREHOLE

(sheet 1 of 1)

SECOR International Incorporated

SM See "Legend to I sampling method		Parratt-V Inc.	Volff,	Project Name: Sunoco, Inc. us Hook Refinery, PA	Method/Equips Hollow Stem A Split Spoo	Auger	1	/ell Numl
classifications ar testing methods	d laboratory	Diam.(in.);	Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive wt.(lbs.		Drop Dist.(in.
Well Constructio	Depth, (ft.)	Sample Type		Description			4	Kecovery PID Dending
Bentonit Seal #1 Sand	e -	SA	ND, fine: little me	nedium to coarse sand, little firedium to coarse sand, gray, more dium to coarse sand, gray,		brown,	1.0	0.0
Schedule PVC, 20	40 Slot 5—	SIL:	I' little fine sond	edium to coarse sand, gray, mo			1.7	0.0
	-		, mile clay, trace	fine sand, gray/dark gray, dry			1.6	0.0
	10-	CLA	Y AND SILT; tra	ce fine sand, gray/black, dry			2.0	0.0
			370	fine sand, black, moist. fine sand, black, moist.	it.		1.2	0.0 0.0 35.3
	15—	CLAY	; little silt, trace t	fine sand, black, moist.			1.6	81.6 35.9
				ine sand, black, moist.			2.0	175
				ne sand, black, moist.			1.7	58.1
Bottom Plug #1 Sand	20—						2.0	66.5
ubstrata descript	tions above a	re generali-		nd based upon visual/manual				-

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01009.02

Date 2002

Log of Well

OG OF BOREHOLE

Figure

SM See "Legend to sampling metho	Date Drille 06/20/02 Logs" for	Parr	g Contractor att-Wolff, Inc.	Marci urface	Project Name: Sunoco, Inc. us Hook Refinery, PA	Method/Equip Hollow Stem A Split Spoo	Auger		W-21
sampling methods classifications a testing methods	nd laboratory	Diam.(i	Diam.(in.): Elev.(ft.): Groundwater Depth (ft.): Total Drive						Drop Dist.(in.)
Well Construction	Death. (#)	Sample Type			Description	17.0		Recovience	PID Reading (read)
Bentoni Seal	-	- :	CLAY; so SILT AND	me fine to	coarse sand, brown, moist, ine to coarse; little fine grave] 1.0	
#1 Sand Schedul	e 40				black, dry.	i, gray, dry.			0.0
PVC, 20	Slot]						0.4	0.0
	5-			e tine to co	oarse sand, little silt, brown/b			1.1	0.0
				- LING BUILD	parse sand, little silt, brown/b , little silt, brown/black, mois	lack, dry.		1.2	0.0
	10-		CLAY; trace	e fine sand	, black, moist.			0.9	14.7
	-		CLAY; little Piece of fine	silt, trace gravel at b	fine sand, black, moist. oottom of spoon.			0.8	40.5
	-		CLAY AND	SILT; little	e fine to coarse sand, black/b	rown, moist.		1.0	11.3
	15-	S	CLAY; some SILT; little fir	silt, little i	fine to coarse sand, black, mottle clay, black/gray, dry.	ist.		1.3	14.1
Bottom Plu	g	S	ILT; some cl	ay, little fi	ne sand, black, dry.			1.1	19.3
									19.5
	20-								
	1 7								

ect No. 62SU.01009.02

Date . 2002

Figure

'HILIPS ISLAND.GPJ OG OF BOREHOLE

International Incorporated

SM See "Legend to	Date Drilled: 06/19/02 Logs" for	Parratt-W Inc. Boring	olff, Marcu	Project Name: Sunoco, Inc. Is Hook Refinery, PA	Method/Equipa Hollow Stem A Split Spoo	Augar		ell Numb
sampling metho classifications a testing methods	nd laboratory	Diam.(in.):	Surface Elev.(fl.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive wt.(lbs.)		W-21 Drop Dist.(in.)
Well Construction	Depth, (ft.)	Sample Type		Description			Recovery	PD Reading (nnm)
Bentoni Seal #1 Sand		TITI-		oarse sand, some fine gravel, b			0.9	
Schedul PVC, 20	e 40	Tour	h deilling	; somewhat consolidated, whit ; somewhat consolidated, whit pieces of brick and organic m	te dry		0.5	0.0 0.0 0.0
	5—	Toug	D, fine to coarse, h drilling.	(fire brick?), orange, dry.			0.1	0.0
		Unab away	le to drill past 7 f	n; little coarse sand, little clay, eet. Moved well approximate	v 6 feet to the sou	th and	0.3	0.0
	10—		, nue fine to co	arse sand, pieces of brick, blac	ck, dry.	- und	0.6	0.0
		CLAY	: Some silt trace	fine to coarse sand, black, mois te to medium sand, black, wet. fine to coarse sand, black/gray			1.0	0.0 21.2
		\SAND	fine: oronas L	and, black, moi	st.		1.0	11.4 13.9
	15—	Piece o	f metal (1 inch lo	wn, sticky. fine to medium sand, black, d ng by 0.25 inch wide) within r fine to medium sand, black, d		/	0.7	0.0
		Ш		fine to medium sand, black, d			1.0	5.3
	20-		· ·	rme to medium sand, black, dr	y.		0.6	0.0

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

inject No. 62SU.01009.02

Date 2002

Log of Well

Figure

(sheet 1 of 1)

'HILIPS ISLAND.GPJ OG OF BOREHOLE

International Incorporated

SM See "Legend to sampling methy	Date Drilled 06/19/02 Logs" for	Parratt-Wo	lff,	Project Name: Sunoco, Inc. is Hook Refinery, PA	Method/Equipn Hollow Stem A Split Spoo	uger	1	ll Numb W-21
sampling method classifications a testing methods	nd laboratory	Diam.(in.):	Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 17.0	Drive wt.(lbs.)		Drop Dist.(in.)
Well Construction	Depth, (ft.)	Sample Type		Description	17.0		Recovery	PD Reading (mm)
Benton Seal #1 Sand Schedul PVC, 20	e 40	NO R	r, some sin, trai	e fine to coarse sand, brown, ce fine sand, black, dry. lece of brick in shoe of spoon and, moist.		clay,	0.3	0.0
	5-	CLAY	; some silt, trac	e fine to medium sand, black,	moist.		0.4	39.3
	-	CLAV	little alle liest	fine to coarse sand, black, mo fine to coarse sand, black, mo fine sand, black/gray, dry.			0.6	38.9 75.3
	10—	SILT; I	ittle coarse sand	, trace fine to medium sand, b			0.7	24.1 17.4
	15—			coarse sand, trace fine to med		Dist.	0.5	72.3
		CLAY; s	ome silt, little fi	ine to medium sand, black, me	Dist.		0.4	125
	20-							
	-							
ıbstrata descri							1	

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

iect No. 62SU.01009.02

Date 2002

Log of Well

Figure

'HILIPS ISLAND.GPJ OG OF BOREHOLE

(sheet 1 of 1)

SECOR International Incorporated

Logged By: SM See "Legend to	Dates Dr 06/25/ 06/26/ Logs" for	/02 /02	Pa	illing Contractor arratt-Wolff, Inc. oring	Marcu Surface	Project Name: Sunoco, Inc. s Hook Refinery, PA	Method/Equipme Hollow Stem A Split Spoon	uger		Number V-216
sampling metho classifications a esting methods	nd labora	tory	Dia		lev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 30.0	Drive wt.(lbs.):	Dis	Drop st.(in.):
Well Constructi	on	Depth, (ft.)	Sample Type	WIII 2		Description			Recovery	PID Reading (ppm)
		-		SAND, I	fine to coars	e AND SILT; little fine gravine to coarse; little fine grav	el, pieces of brick, bro	own, dry.	1.3	0.0
Benton Seal #1 Sand				SILT; so	me fine to co	ine to coarse; little fine grave	el, pieces of brick, bro	own, dry.	1.2	0.0 0.0 0.0
Schedul PVC, 20		5—		SILT; litt	le fine to co	arse sand, brown, dry.			0.4	0.0
	Joint	-	İ	SILT; litt	le fine to co	arse sand, brown, dry.			1.2	
		-	4	SAND, co SILT AN CLAY; so	D SAND, fire ome fine to co	GRAVEL, fine; trace fine to ne to coarse; trace fine grave coarse sand, little silt, brown	coarse sand, black, mel, black, moist, oil.	oist, oil.	1.8	
		10—				e fine to medium sand, gray			1.0	
		-		CLAY AN	ND SILT; lit	le fine to coarse sand, trace	fine gravel, gray, moi	st, oil.	1.1	(8)
	1	5—		CLAY; som	me silt, little e clay, little	fine to medium sand, gray, fine to medium sand, black	moist. dry.		1.3	
		7		CLAY; som	me silt, little	fine to medium sand, brown	n/gray, moist.		1.8	
		-	H	SILT; some	e clay, little	fine to medium sand, trace of	oarse sand, black, mo	ist.	1.1	
	20)		CLAY; son	ne silt, little	fine to medium sand, trace (coarse sand, black, mo	ist.	1.3	
		1				fine to medium sand, trace o		ist.	1.0	ı
		-		SILT AND	CLAY; trace	ine to medium sand, black, a e fine to coarse sand, black, s and based upon visual/ma	moist.		0.9	- 1

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inject No. 62SU.01009.02

Date 2002

Log of Well

Figure

Logged By: SM	Dates Drilled 06/25/02 06/26/02	P	rilling Cor arratt-V Inc.	Volff,		Project Name: Sunoco, Inc. ss Hook Refinery, PA	Method/Eq Hollow Ste Split S	m Auger		fumber:
See "Legend to sampling methoclassifications a testing methods	od, and laboratory	Di	Boring am.(in.):	S Ele	urface ev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.)	Drive		rop t.(in.):
Well Construct	ion (f)	Sample Type		ŧs.		Description			Recovery	PID Reading (ppm)
		-	S	ILT AN	D CLAY;	trace fine to coarse sand, bla	ack, moist.		1.0	
	30-		C	LAY; tr	ace fine sa	nd, black, moist.			1.4	
								· · · · · · · · · · · · · · · · · · ·		
		-								
	35-	-				ä				
			ŀ							
	40-									
	45-									
e substrata de	escriptions al	nove a	Fa gange	dina d		ons and based upon viewal/w				

Project No. 62SU.01009.02

Date 2002

Log of Well

PHILIPS ISLAND.GPJ LOG OF BOREHOLE

Figure



	ling Contractor rratt-Wolff, Inc.	Marcu	Project Name: Sunoco, Inc. s Hook Refinery, PA	Hollow Stem A	Auger	Well Number
	oring S	Surface Groundwater Depth (ft.): Total D		Drive wt.(lbs.):	Drop Dist.(in.):	
Sample Type			Descrip	tion		
	CLAY; I CLAY; I CLAY; I CLAY; I	ittle silt, litt L, fine ANI ittle silt, litt race fine to	tle fine gravel, little fine to detect the fine to coarse sand, black to SAND, coarse; trace silt, the fine to medium sand, grave coarse sand, trace silt, gray, to coarse sand, little clay, gray, to coarse sand, to coarse sand, to coarse sand, little clay, gray, to coarse sand, to coarse sand, t	coarse sand, dark brock, moist. race fine to medium y/brown, moist.	sand, black,	
	Par Bo Dian	Parratt-Wolff, Inc. Boring Diam.(in.): SILT; so. CLAY; I CLAY; I SILT; litt CLAY; Ii	Parratt-Wolff, Inc. Boring Diam.(in.): Sand, fine to coars SILT; some clay, litt CLAY; little silt, litt CLAY; little silt, litt CLAY; little fine to coars CLAY; trace fine to CLAY; little fine to coars	Parratt-Wolff, Inc. Boring Diam.(in.): Surface Elev.(ft.): SAND, fine to coarse; some silt, little fine gravel, little fine to coarse sand, black CLAY; little silt, little fine to coarse; trace silt, to clay; little silt, little fine to medium sand, gravel, little fine to coarse sand, trace silt, gray, little fine to coarse sand, little clay, gray, and clay; little fine to coarse sand, little clay, gray, little fine to coarse sand, little silt, black CLAY; little fine to coarse sand, little clay, gray, little fine to coarse sand, little silt, black	Parratt-Wolff, Inc. Boing Diam.(in.): Bring Surface Diam.(in.): SAND, fine to coarse; some silt, little fine gravel, pieces of brick, be SILT; some clay, little fine to coarse sand, black, moist. CLAY; little silt, little fine to medium sand, gray/brown, moist. CLAY; little fine to coarse sand, trace silt, gray, moist, oil. SILT; little fine to coarse sand, little clay, gray, moist. CLAY; little fine to coarse sand, little clay, gray, moist. CLAY; little fine to coarse sand, little clay, gray, moist. CLAY; little fine to coarse sand, little clay, gray, moist, oil from 17	Parratt-Wolff, Inc. Sunoco, Inc. Marcus Hook Refinery, PA Hollow Stem Auger Cuttings

Project No. 62SU.01009.02

Date 2002

Log of Well

PHILIPS ISLAND.GPJ LOG OF BOREHOLE

Figure

SECOR International Incorporated

Logged By: SM	Date Drilled: 06/27/02	Drilling Con Parratt-V Inc.	Volff, Marc	Project Name: Sunoco, Inc. us Hook Refinery, PA	Method/Equipm Hollow Stem A Cuttings	uger	Well Number.
See "Legend to sampling metho classifications a testing methods	Logs" for od, and laboratory	Boring Diam.(in.):	Surface Elev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive wt.(lbs.):	Drop Dist.(in.):
Well Constructi	Depth, (ft.)	Sample Type		Descrip			
ne substrata des	30— 35— 40— 45—		LAY; trace fine sa	and, black, moist.			

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

nject No. 62SU.01009.02

Date 2002

Log of Well

PHILIPS ISLAND.GPJ LOG OF BOREHOLE

Figure



Logged By:	Date D 06/2	6/02	Parra	g Contractor att-Wolff, Inc.	Marcu	Project Name: Sunoco, Inc. s Hook Refinery, PA	Method/Equipment: Hollow Stem Auger Cuttings	Well Number		
See "Legend to sampling method classifications a testing methods	Logs" food, and labor	atory	Borir Diam.(i	ng S in.): El	urface ev.(ft.):	Groundwater Depth (ft.)	Total Drive wt.(lbs	Drop		
Well Construct	ion	Depth, (ft.)	Sample Type	Description						
							wel, pieces of brick, brown, dr	у.		
Benton Seal #1 Sar	- 1					little fine to coarse sand, br				
		5	ј Ш			e fine to coarse sand, black				
Sched PVC,	ule 40 20 Slot					e fine to coarse sand, trace	fine gravel, black, dry.	? feet.		
		10-				e e				
		15—		SILT AN	D CLAY; li	ittle fine to coarse sand, bla	ck, moist.			
		20-		SILT; son feet.	ne clay, little	e fine to coarse sand, black	, moist, plastic present at appro	ximately 21		
	lana-tuti	_					manual classification of cutting			

roject No. 62SU.01009.02

Date 2002

Log of Well

PHILIPS ISLAND.GPJ LOG OF BOREHOLE

Figure



Logged By: Date Drilled:	Drilling Contra	actor	Project Name:	Method/Equipm Hollow Stem A	ient:	Well Number:
SM 06/26/02	Parratt-Wo Inc.	Marcus	Sunoco, Inc. Hook Refinery, PA	Cuttings		MW-218
See "Legend to Logs" for sampling method, classifications and laboratory testing methods	Boring Diam.(in.):	Surface Elev.(ft.):	Groundwater Depth (ft.)	Total Depth (ft.): 30.0	Drive wt.(lbs.):	Drop Dist.(in.):
Well (1) That a	Sample Type		Descri	ption		
35-	- CI	LAY; little silt, tra	ce fine sand, black, moist.			

Project No. 62SU.01009.02

Date 2002

Log of Well

PHILIPS ISLAND.GPJ LOG OF BOREHOLE Figure



Logged By:	Date Dr			ling Cor rratt-V Inc.	Volff,	Marcu	Project Name: Sunoco, Inc. is Hook Refine	гу, РА	Method/Equip Hollow Stem Split Spo	Auger	Well No	
See "Legend to ampling metho classifications a esting methods	Logs" food,	r		oring m.(in.):		urface ev.(ft.):	,	ter Depth (ft.):	Total Depth (ft.): 30.0	Drive wt.(lbs.):	Dist.	rop .(in.):
Well	Well Construction Well SILT; some fine to coarse sand, trace fine gravel, brown, dry.								Recovery	PID Reading (ppm)		
		ā			SILT; so	me fine to	coarse sand, tra	ce fine grave	l, brown, dry.		1.0	7.1
Seal								0.8	5.3 25.0			
#1 Sa	#1 Sand SILT; little fine to coarse sand, little clay, pieces of brick, black, dry.							0.6	22.			
	Schedule 40 PVC, 20 Slot SILT; little fine to coarse sand, little clay, black, dry. SILT; some clay, little fine to coarse sand, gray, dry.						1.4	5.5 13.				
		N 62			SAND,	fine to coar	se AND SILT; stone in shoe o	gray, dry.			0.0	22.
		10-			CLAY;	some silt, l	ittle fine to med	lium sand, pie	ece of wood, gray/l	orown, moist.	0.3	25.
		9.			CLAY A	AND SILT;	little fine to co	arse sand, bro	own, moist, oil.		1.3	14.
				шш			medium sand,					20.
		15-	-		SILT; li	ttle fine to o	coarse sand, litt	le clay, gray,	moist.		0.2	5.3
			1		SILT; so	ome clay, li	ttle fine to med	ium sand, pie	ce of wood, gray/b	rown, moist.	1.1	13.
							ttle fine to med medium sand,		y/brown, moist.		1.1	0.0 7.4
		20-		1111111	moist.				es of brick and woo	od, brown,	1.4	3. 6.
				#	CLAY;	trace silt, tr	tle fine to medi race fine sand, l and, trace silt, b	olack, moist.	ek, moist.		0.6	25. 16.
			-		CLAY;	little fine s	and, trace silt, t	olack, moist.		- 1/2	1.3	17.

Project No. 62SU.01009.02

Date 2002

Log of Well

Figure

PHILIPS ISLAND.GPJ LOG OF BOREHOLE



Logged By: SM	Date Drill 06/26/0)2	Pa	ling Con rratt-W Inc.	tractor olff,	Marcu	Project Name: Sunoco, Inc. Is Hook Refiner	y, PA	Method/Equip Hollow Stem Split Spo	Auger	Well No	
See "Legend to ampling metho lassifications a esting methods	Logs" for od, and laborato	пу	Bo Diar	oring n.(in.): 4	Si Ele	urface ev.(ft.):	Groundwate	r Depth (ft.):	Total Depth (ft.): 30.0	Drive wt.(lbs.):	D Dist	rop .(in.):
Well Constructi	ion	Depth, (ft.)	Sample Type				Des	cription		⊚	Recovery	PID Reading (ppm)
		-		C	LAY; li	ittle fine sa	nd, trace silt, bla	ıck, moist.			2.0	34.1
		_		C	LAY; li	ittle fine sa	nd, trace silt, bla	ick, moist.			2.0	23.0
1		30—										
		_										
	1	35—										
		-										
		40—										
		-										
ě		-										
		45—										
		-										
		-										

Project No. 62SU.01009.02

Log of Well

PHILIPS ISLAND, GPJ LOG OF BOREHOLE

Figure

International Incorporated

Logged By: SM See "Legend to	Date Drill 06/27/0 Logs" for		Drilling Cor Parratt-V Inc. Boring	Volff,	Marcu	Project Name: Sunoco, Inc. is Hook Refinery, PA	Method/Equip Hollow Stem Split Spoo	Auger		Vell Numb
sampling methods classifications a testing methods	xd, and Inhorator	ту	Diam.(in.):	Sur Elev	face .(ft.):	Groundwater Depth (ft.):	Total Depth (ft.):	Drive wt.(lbs.)		Drop Dist.(in.)
Well Constructi	on	Depth, (ft.)	Sample Type	LT: little	fine to co	Description	_			Recovery PID Reading (
Benton Seal	ite	7	HILL			earse sand, trace clay, trace fi		ry.	TI	.1 0.0
#1 Sand	1		SA	ND fine	to coarse	le fine to coarse sand, brown le fine to coarse sand, little s ; little silt, gray, dry.	ilt, brown, dry.		1.	.2 0.0
Schedul PVC, 20	e 40 Slot	-		. io, inic	w coarse	; little silt, little fine gravel, g			0.	6 0.0
		-				fine to coarse sand, brown/g			0.5	7 0.0
	10-	1				edium sand, little silt, trace c	oarse sand, brown/g	gray,	0.5	6.0
		-		o or mic į	graver III	fine sand, gray, moist. shoe of spoon.			0.3	5.3
		-				fine sand, gray, moist.			0.5	0.0
	15-					some silt, black, moist.			0.5	8.0
	1					e fine to coarse sand, black, r			0.6	21.0
	20-		200			fine to coarse sand, black, n	noist.		1.0	9.7
	-		SILT;	little clay	, little fin	orange brown, moist. fine to coarse sand, black, m e to medium sand, black, mo	ist.	F	0.9	7.6 5.0 9.6
						ne to coarse sand, black, mois	st.		0.8	22.5
Uhstrata descr	intions	Ш	SILT; I e generalize redominant	ittle fine	to coarse	sand, black, moist, oil.			0.1	25.1

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Denject No. 62SU.01009.02

Date 2002

Log of Well

HILIPS ISLAND GPJ LOG OF BOREHOLE

Figure



Logged By: SM See "Legend to	06/27	7/02	Pa	illing Cont rratt-W Inc.	olff,		Project Name: Sunoco, Inc. s Hook Refinery, PA		Method/Equipm Hollow Stem A Split Spoot	uger		Number:
See "Legend to sampling metho classifications a testing methods	od, and labora	atory	Dia	oring m.(in.):	St Ele	urface ev.(ft.):	Groundwater Depth (ft.)):	Total Depth (ft.): 30.0	Drive wt.(lbs.):		Orop rt.(in.):
Well Constructi	ion	Depth, (ft.)	Sample Type	œ.			Description				Recovery	PID Reading (ppm)
		0-		11111			e of spoon. ace fine to coarse sand, gra	y, moi	st.		0.5	8.4
		i=									0.5	0.4
		=		Ci	AY; so	me silt, lit	tle fine to coarse sand, blac	ck, mo	ist.		0.9	6.7
		30—										
		-										
		Ě										
		35—										
	İ	-										
		-										
		40—										
		-										
		_										
		45—										
		-	l									
		-										
e substrata de												

Project No. 62SU.01009.02

Date 2002

Log of Well

rHILIPS ISLAND, GPJ LOG OF BOREHOLE

Figure



Logged By:	Date Dr 07/23	- 1	Dril Pa	ling Contr rratt-Wo Inc.	olff,	Marcu	Project Nam Sunoco, In Is Hook Ref	c.		Method/Equipn Hollow Stem A Cuttings	ient; Auger	Well Number
ee "Legend to mpling metho assifications a sting methods	Logs" for	ntory	Be Dian	oring n.(in.):	Surf Elev.	ace		water Depth (f	t.):	Total Depth (ft.): 30.0	Drive wt.(lbs.):	Drop Dist.(in.):
Well Construct		Depth, (ft.)	Sample Type					Descr	ription			
			Ħ	LI	THOLOG	GY SIMI	ILAR TO A	DJACENT W	ELL, N	fW-219		A
Bento Seal #1 Sa		3					×					
Sched PVC,	ule 40 20 Slot	5-										
							t	-				
		10-										
		15-										
		3										,
		20-										
		3										
										ual alassification		

Project No. 62SU.01009.02

Date 2002

Log of Well

PHILIPS ISLAND.GPJ LOG OF BOREHOLE

Figure

SECOR International Incorporated

CY 0	te Drilled: 7/23/02	Dril Par	ling Contractor rratt-Wolff, Inc.	Marcus	Project Name: Sunoco, Inc. s Hook Refinery, PA	Method/Equipa Hollow Stem A Cuttings	Auger	Well Number: MW-221
ce "Legend to Log- ampling method, assifications and le sting methods	s" for aboratory	Bo Diar	rring S	urface ev.(ft.):	Groundwater Depth (ft.)		Drive wt.(lbs.):	Drop Dist.(in.):
Well Construction	Depth, (ft.)	Sample Type			Descri	ption		
Bottom P	30- 35- 40-							

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Project No. 62SU.01009.02

Date 2002

Log of Well

PHILIPS ISLAND.GPJ LOG OF BOREHOLE Figure



Logged By:	Date D		Dri	ling Con	tractor		Project Name:		Method/Equipm Hollow Stem A	ent: uger	Well Number:
CY	07/23	3/02	ra	Inc.	vont,	Marcu	Sunoco, Inc. s Hook Refinery, PA		Cuttings		MW-222
see "Legend to sampling method classifications testing method	D Logs" for lod, and laborals	ratory	B- Dia	oring m.(in.):	S El	surface lev.(ft.):	Groundwater Depth (ft.	.):	Total Depth (ft.): 30.0	Drive wt.(lbs.):	Drop Dist.(in.):
Well Construc	l	Depth, (ft.)	Sample Type				· Descr				
		<u> </u>	T	1	LITHOI	LOGY SIMI	LAR TO ADJACENT W	ELL, N	AW-220		
Seal #1 S	onite and edule 40	10-			LITHOI	OGY SIMI	LAR TO ADJACENT W		11 44-220		
									nual classificati	6	and/or

Project No. 62SU.01009.02

Date 2002

Log of Well

PHILIPS ISLAND.GPJ LOG OF BOREHOLE Figure



Logged By:	Date Drilled: 07/23/02	Pa	lling Contractor rratt-Wolff, Inc.		Project Name: Sunoco, Inc. s Hook Refinery, PA	Method/Equipn Hollow Stem A Cuttings	uger	Well Number				
See "Legend to sampling metho classifications a testing methods	Logs" for od, and laboratory	B Dia	oring	Surface Elev.(ft.):	Groundwater Depth (ft.):		Drive wt.(lbs.):	Drop Dist.(in.):				
Well Construct	ф (Д)				Description							
Botton	m Plug 30											

Project No. 62SU.01009.02

Date 2002

Log of Well

PHILIPS ISLAND.GPJ LOG OF BOREHOLE

Figure

SECOR

Logged By: Date Dr	illed:	Drilling Cor Parratt-V	Volff,	Marcu	Project Name: Sunoco, Inc. 3 Hook Refinery, PA	He	Method/Equipm ollow Stem A Cuttings	ent: uger	Well Number: MW-223
CY 07/24 © "Legend to Logs" for impling method, assifications and labora sting methods	atory	Boring Diam.(in.):	T Si	urface ev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 26.0	Drive wt.(lbs.):	Drop Dist.(in.):
Well . Construction	Depth, (ft.)	Sample Type			Descr	iption			-
Bentonite Seal #1 Sand Schedule 40 PVC, 20 Slot	10-		LITHOL	OGY SIMI	LAR TO ADJACENT W	ELL, MV			

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Project No. 62SU.01009.02

Date 2002

Log of Well

PHILIPS ISLAND.GPJ LOG OF BOREHOLE Figure

SECOR International Incorporated

CY	07/24/02	Drilling Co Parratt- Inc	Wolff,	Marcu	Project Name: Sunoco, Inc. s Hook Refinery, PA	Method/Equipm Hollow Stem A Cuttings	Auger	Well Number MW-223
See "Legend to L sampling method classifications and esting methods	d laboratory	Boring Diam.(in.):	Ele	urface ev.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 26.0	Drive wt.(lbs.):	Drop Dist.(in.):
Well Construction	Depth, (ft.)	Sample Type			Descript	ion		
Bottom I	Plug		:					
	35—				20			
	40			રહ્ય				
	-							

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

^Droject No. 62SU.01009.02

Date 2002

Log of Well

PHILIPS ISLAND.GPJ LOG OF BOREHOLE

Figure

(sheet 2 of 2)



Logged By: Date I CY 07/2	Orilled: 3/02	Drill Par	ling Contractor rratt-Wolff, Inc.	Marcu	Project Name: Sunoco, Inc. Is Hook Refinery, PA	Method/Equipm Hollow Stem A Cuttings	luger	Well Number MW-224
ee "Legend to Logs" f ampling method, assifications and labo sting methods	or ratory	Dian	ring 5 a.(in.): E	Surface lev.(ft.):	Groundwater Depth (ft.)		Drive wt.(lbs.):	Drop Dist.(in.):
Well Construction	Depth, (ft.)	Sample Type	N		Descri	ption		
Bentonite Seal #1 Sand Schedule 40 PVC, 20 Slot	5		LITHOL	OGY SIMI	LAR TO ADJACENT WE	LL, MW-225		

Project No. 62SU.01009.02

Date 2002

Log of Well

PHILIPS ISLAND.GPJ LOG OF BOREHOLE

Figure



	Date Drilled		Orilling Co	Wolff,		Project Name: Sunoco, Inc.		Method/Equipm Hollow Stem A	uger	Well Nu	
CY	07/24/02	:	Inc			s Hook Refinery, PA		Split Spoor		MW-	225
See "Legend to I sampling method classifications an testing methods	d. T	y I	Boring Diam.(in.):		erface v.(ft.):	Groundwater Depth	(ft.):	Total Depth (ft.): 30.0	Drive wt.(lbs.):	Dr Dist.	op (in.):
Well Construction	on	Depth, (ft.)	Sample Type			Descriptio	on 			Recovery	PID Reading (ppm)
Benton	nite	-		FILL; sih	and grave	l, some fine to medium	sand, bro	wn, dry.	,	1.0	16.1
Seal Industr				FILL; silt	and grave	l, some fine to medium	sand, bro	own, dry.		1.7	15.5
Granite	ıle 40	5-		FILL; silt	and grave	l, some fine to medium	sand, bro	own, dry.		1.3	11.4
PVC, 2	20 Slot			FILL; silt and gravel, some fine to medium sand, brown, dry. FILL; silt and gravel, some fine to medium sand, brown, dry.							16.9
										1.3	14.5
	1	10		STONE		d, gray with some oran			gray/brown,	0.4	7.4 7.4 7.4
						ium AND SILT; little g				2.0	10.5
	1	15—		SILT; litt odor. PI SILT; so	le fine to r D reading one fine to	medium sand, little clay of 88.9 ppm from 13.8 medium sand, some gr sh-brown/brown, moist	, grayish- to 14 feet avel, some	brown, little mo	isture, slight	2.0	88.9 146
		_		SILT; litt within re SILT AN	tle clay, da covery. ID CLAY;	rk gray/black, moist, od black, dry.	dor. One			1.3	83.6 54.7
				tight. SILT AN	ID SAND,	SILT; some medium sar fine to medium; black, ack, moist, odor.	•	ravel, dark brov	vn, dry,	2.0	77.8 47.6 47.6
	2	20—		SILT; litt SAND, f odor.	tle gravel, ine to med	little fine sand, little cla ium AND SILT; some	coarse sar	nd, grayish-brow	odor. /n, moist,	0.8	49.8 48.6
				\SILT; so SILT; so little pro-	me fine to me clay, so duct observ	ttle gravel, little fine sa medium sand, some gr ome fine sand, little me ved. Clay lens at 23.5 t	avel, some dium sand	clay, gray, moi l, gray with pink	ish specks,	2.0	42.0 30.1
				23.75 to SILT; so	23.79 feet. me fine sa	nd, some clay, little me	dium sano	l, gray with pink	rish specks,	2.0	36.6

Project No. 62SU.01009.02

Date June 2002

Log of Well

PHILIPS ISLAND.GPJ LOG OF BOREHOLE

Figure



Logged CY		Date Drille 07/24/02	2	Par	ing Con rratt-V Inc.	Volff,	Marcu	Project Name: Sunoco, Inc. s Hook Refinery	, PA	Method/Equip Hollow Stem Split Spo	Auger	Well No			
See "Lege sampling classificat testing me	end to Lo method, tions and ethods	ogs" for d laborator	гу	Dian	ring 1.(in.): 6	S Ele	urface ev.(fl.):	Groundwater	Depth (ft.):	Total Depth (ft.): 30.0	Drive wt.(lbs.):		op (in.):		
1	Well structio	'n	Depth, (ft.)	Sample Type				Desc	ription			Recovery	PID Reading (ppm)		
			-			vet, prod CLAY; r CLAY; g	olastic betw	veen stratigraphic ct. Plastic at 27.7	layers, dark feet.	gray, product.		2.0	36.6 36.3		
		*	-			CLAY; trace fine sand, gray, product.									
			30												
		6	-												
		i i i	35—												
													£		
		j	40—												
			-												
		ž	_							A*					
		30	45 — -	-	-										
			;= ;=	-						*					
			-			00711000									

Project No. 62SU.01009.02

Date June 2002

Log of Well

PHILIPS ISLAND.GPJ LOG OF BOREHOLE

Figure

(sheet 2 of 2)

SECOR International Incorporated

Logged By: Dates I 07/2 CY 07/2	4/02 5/02	Parrat	Contractor t-Wolff, nc.	Marcu	Project Name: Sunoco, Inc. s Hook Refinery, PA		Method/Equipm Hollow Stem A Split Spoo	Luger	Well Nu	
See "Legend to Logs" for sampling method, classifications and labor testing methods	ratory	Boring Diam.(in	.): S El	urface ev.(ft.);	Groundwater Depth		Total Depth (ft.): 30.0	Drive wt.(lbs.):	Dr Dist.	OĐ
Well Construction	Depth, (ft.)	Sample Type			Description				Recovery	PID Reading (ppm)
Bentonite					l, some fine to mediun		•		0.8	12.2
Seal Industrialized Quartz			FILL; sil	t, some gra	vel, some fine to medi	um sand, 1	brown, dry.		0.7	9.5
Schedule 40	/C, 20 Slot — 💢							1.5	148	
F VC, 20 SIO	VC, 20 Slot NO RECOVERY						0			
			SILT AN moist, oc	ND CLAY; dor.	some fine to medium s	sand, some	e gravel, grayish	-brown,	1.0	16
	10		moist, o	dor.	little gravel, little fine			brown,	2.0	12.4
	:		grayish-l	brown/gree	some fine to medium s nish-brown/brown/darl	k brown, r	noist to wet, odd	or.	2.0	5.3
	15-	-	grayish-l	brown/gree	some fine to medium s nish-brown/brown/darl	k brown, 1	noist to wet, ode		2.0	6.4
			\SILT; so □\odor.	me fine sar	ium AND SILT; little gad, little clay, trace san	d, trace gr	avel, gray-brow	n, moist,	2.0	50.1 8.6 8.6
	SILT; some fine sand, little clay, trace sand, trace gravel, blackish-brown, moist, odor. SILT; some fine sand, some clay, little medium sand, gray with pink specks, moist, odor.							0.8	9.2 8.7 8.4	
	20-		SAND,	me clay, lit	d, little clay, gray-brow tle fine to medium san ium AND SILT; little of t 21 5 feet	d, little gr	avel, brown, dry	7. /	1.2	9.7
			SAND,	fine to coar	se; some silt, brown w		. ,		1.2	12,2
			SILT; so	me fine to	medium sand, little sar nd, little clay, trace gra	nd, dark bi vel, dark g	rown, wet, produ gray, wet.	uct.	1.0	70.4 39.6

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01009.02

SU.01009.02 Date June 2002

Log of Well

PHILIPS ISLAND.GPJ LOG OF BOREHOLE

Figure



Logged F	07. 07.	S Drilled: /24/02 /25/02		ling Cor rratt-V Inc.	Volff,	Marcu	Project Nan Sunoco, II Is Hook Re	1C.		Method/Equipm Hollow Stem A Split Spoo	luger	Well No	
See "Leger sampling r classificati testing me	nd to Logs' method, ions and lal thods	for	B Dia	oring n.(in.): 6	S El	urface ev.(ft.):	Ground	iwater Depth (ft	i.):	Total Depth (ft.): 30.0	Drive wt.(lbs.):		rop .(in.);
	Well struction	Depth, (ft.)	Sample Type					Description				Recovery	PID Reading (ppm)
					SILT; so	ome fine to	medium san	d, little clay, t	race gr	avel, dark gray,	wet.	1.7	21.6
				1	SILT; so	me fine to	medium san	d, little clay, t	race gr	avel, dark gray,	wet.	1.3	30.4
		30-		2	SILT AN	ND SAND,	fine to med	ium; some gra	vel, tra	ce clay, gray, w	et.		30.4
			-										
		35-	\dashv										
			1										
			4										
		40-	-										
												:	
													:
			-										
		45-											
			4										

Project No. 62SU.01009.02

Date June 2002

Log of Well

PHILIPS ISLAND.GPJ LOG OF BOREHOLE

Figure

(sheet 2 of 2)

Logged By:			D :	111							
CY	Date Dr 08/28		Ps	lling Cont	ractor olff,		Project Name: Sunoco, Inc.		Method/Equipm		Well Number:
See "I arrend to	Tarell fo	702		Inc.		Marcu	s Hook Refinery, PA		Hollow Stem	luger	a
See "Legend to sampling metho classifications a testing methods	od, and labora	atory	Dia	oring m.(in.): 4	St Ele	urface ev.(ft.):	Groundwater Depth (fl	i.):	Total Depth (ft.): 15.2	Drive wt(lbs.):	Drop Dist.(in.);
Well Constructi Bentor Seal #1 San Schedi	nite nd ule 40 20 Slot	20—	Dia Sample Type	4	Ela	ev.(ft.):	Description LAR TO MW-212. Heavy	on	Depth (ft.): 15.2	wt.(lbs.):	Drop Dist.(in.):
ne substrata de	escription	ns abov	e ar	e general	ized rea	presentation	ns and based upon visual/		1 1 10 1		

Project No. 62SU.01009.02

Date 2002

Log of Well

HILIPS ISLAND.GPJ LOG OF BOREHOLE

Figure

Logged By: Date Di CY 08/28	rilled:		ling Contractor rratt-Wolff, Inc.	Marcu	Project Name: Sunoco, Inc. s Hook Refinery, PA		Method/Equipm Hollow Stem A	1	Well Nu	
ee "Legend to Logs" fo impling method, assifications and labora sting methods	r		oring S	urface ev.(ft.):	Groundwater Depth (ft.)		Total Depth (ft.): 15.0	Drive wt.(lbs.):		op (in.):
Well Construction	Depth, (ft.)	Sample Type			Descriptio	on				PID Reading (ppm)
Bentonite Seal Schedule 40 PVC, 20 Slot	5		LITHOL	OGY SIMI	LAR TO MW-213. Soil o	n auge	r is covered wit	h product.		0 - 20

Project No. 62SU.01009.02

Date 2002

Log of Well

. HILIPS ISLAND.GPJ LOG OF BOREHOLE

Figure

SECOR International Incorporated

MW-242

international Inc	corporal	rea ·						. (
Logged By:		Drilled:	Dril Pa	lling Contractor		Project Name: Sunoco, Inc.		Method/Equipm	nent:	Well Numbe
CY Tagged to	U8/2	8/02		Inc.	Marcu	s Hook Refinery, PA		Hollow Stem	lugor	
See "Legend to sampling metho classifications a testing methods	od, ind labo	ratory	Diar	oring n.(in.):	Surface llev.(ft.):	Groundwater Depth (ft	.):	Total Depth (ft.): 15.4	Drive wt.(lbs.):	Drop Dist.(in.):
Well Constructi		Depth, (ft.)	Sample Type	LITHOI	OOV OD O	Description				PID Reading (rnm)
Benton Seal Schedu PVC, 2	ile 40 0 Slot	5				LAR TO MW-211. Heavy				0 - 19
substrata des ples obtained	cription	ns above	e are	generalized re	presentation	s and based upon visual/m	anual (classification of	cuttings and/	

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01009.02

Date 2002

Log of Well

A HILIPS ISLAND, GPJ LOG OF BOREHOLE

Figure



MW-244

international Inc	orporatea						4-10-		
Logged By:	Date Drilled: 08/28/02	Pa	illing Contracto arratt-Wolff Inc.		Project Name: Sunoco, Inc. IS Hook Refinery, PA	,	Method/Equipm		Well Number
See "Legend to I sampling method classifications are esting methods	Logs" for d, id laboratory	Dia	Roring m.(in.);	Surface Elev.(ft.):	Groundwater Depth (ft.)):	Total Depth (ft.): 15.0	Drive wt.(lbs.):	Drop Dist.(in.)
Well Construction	Depth, (ft.)	Sample Type			Descriptio	n	7	¥	PID Reading fram
Bentoni Seal # 1 Sand Schedul PVC, 20	10— 15— 20—				S and based upon viewal/over	1 auger	was free of pro	oduct.	0-1

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01009.02

Date 2002

Log of Well

THILIPS ISLAND.GPJ LOG OF BOREHOLE

Figure



Logged By:	Date D			lling Cor rratt-V Inc.	Volff,	Marcu	Project Name: Sunoco, Inc. s Hook Refinery, PA	Method/Equipm Hollow Stem A Split Spoo	Auger	Well N	
See "Legend to sampling metho classifications testing methods	od, and labor	ratory	B Dia	oring m.(in.):		urface ev.(ft.):	Groundwater Depth (ft.):		Drive wt.(lbs.):	D Dist	тор .(in.):
Well	tion	Depth, (ft.)	Sample Type				Description	0		Recovery	PD Reading (ppm)
Bento Seal	nite	18			SILT; son noist.	me gravel/r	ock fragments, little fine to	medium sand, dark b	orown,	1.1	0.0
Indust Granit		3	-) S	SILT AN	D SAND,	fine; some gravel, light bro	wn, dry.		0.6	0.0
	lule 40 20 Slot	5-	1		WOOD F SILT; sor heeting	RAGMEN ne gravel/r at 5.6'.	IT ock fragment, some fine sar	nd, dark brown, mois	t, plastic	2.0	0.0
		3		III \n	nedium s	and, brown	nedium sand, little gravel, t		1	2.0	0.0
		e e		THIS S	ILT AN	ne to medi	oon odor. fine; brown, little rock and um AND SILT. ittle fine to medium sand, tr			2.0	0.0 0.0 0.0
		10-		S S	light pet	roleum hyd ne gravel/r	lrocarbon odor. ock fragments, some fine to petroleum hydrocarbon odo	medium sand, trace		1.6	0.0
		5		$\Pi\Pi^{\dagger}\backslash R$	OCK FI	RAGMENT	CLAY, gray; little fine to mo CS. le fine to medium sand, dar		oleum	1.8	0.0
		15—			ydrocart ILT AN AND, fi	on odor. D SAND, f ne to medic	fine to coarse; brown, moist um AND SILT, black, tar-li	petroleum hydrocar	bon odor.	2.0	0.0 0.0 0.0
				S	AND, fi	oon odor. ne to media D CLAY; I	um; some silt, brown, moist ittle fine sand, brownish gra	, presence of free pro ay, wet, petroleum hy	oduct.	0.8	0.0
		-		S	ILT AN	D CLAY; I D CLAY; g	ittle fine sand, gray, wet, pr gray, wet, presence of free p	esence of free product.	it.	0.6	0.0
		20-		S	ILT; littl	e clay, little	e fine to medium sand, wet,	presence of free prod	duct	1.0	0.0
		8		\fi	AND, fii brous, si	ne to medit Ity materia	gray, wet, presence of free p im AND SILT; brown, wet, I along side of spoon from 2	presence of free production 22.6-22.9.	duct, white,	2.0	0.0 0.0 0.0
		2		S	ILT ANI	CLAY; I	ittle gravel, gray, wet, prese ittle fine to coarse sand, littl	nce of free product.	eum	2.0	0.0

Project No. 62SU.01009.02

Date 2002

Log of Well

PHILIPS ISLAND.GPJ LOG OF BOREHOLE

Figure

CY See "Legend to	Date Drilled: 10/07/02 Logs" for	Drilling Con Parratt-V Inc. Boring	Volff,	Marcu urface	Project Name: Sunoco, Inc. is Hook Refinery, PA	Method/Equip Hollow Stem . Split Spoo	Auger	Well	Numb
See "Legend to sampling metho classifications a testing methods	nd laboratory	Diam.(in.):	Ele	v.(ft.):	Groundwater Depth (ft.):	Total Depth (ft.): 30.0	Drive wt.(lbs.):	Di	f Drop st.(in.)
Well Construction	Depth, (ft.)	Sample Type			Description			Recovery	PID Reading (npm)
		RO	OCK FR.		stuck in tip of spoon, very l			0.1	0.0
	30—	SIL pet	T and S roleum I	AND, fine hydrocarbo	to medium; little clay, little n odor.	gravel, grayish brov	vn, wet,	0.9	0.0
	35—								
					ral times and properly readin lidate olfactory observations and based upon visual/manua				

Project No. 62SU.01009.02

Date 2002

Log of Well

LIPS ISLAND.GPJ LUG OF BOREHOLE

Figure

(sheet 2 of 2)

SECOR International Incorporated

MW-246

Logged By:		Drilled:	D	in: a			44.1			. •
CY	10/0	08/02	P	illing Contractor arratt-Wolff, Inc.	Marce	Project Name: Sunoco, Inc. is Hook Refinery, PA	Method/Equipm Hollow Stem A	uger	We	ll Numbe
See "Legend to sampling metho classifications a testing methods	id, and labo	oratory	Dia	oring m.(in.): E	Surface lev.(ft.);	Groundwater Depth (ft.):	Total Depth (ft.): 30.0	Drive wt.(lbs.)	: 1	Drop Dist.(in.):
Well Construction		Depth, (ft.)	Sample Type	IIII SII T. go		Description			Recovery	PID Reading (ppm)
Benton Seal	ite	7=	$\ \ $	SIL1; SO	me fine to c	oarse sand, little gravel, brow	n, dry.		0.7	
Industri Granite				-[[]]		ine to medium; little gravel, b			0.2	0.0
Schedul PVC, 20	e 40 Slot	5-		1111		edium sand, little gravel, brov	8		0.8	0.0
		-		SILT; som	ne fine to me	edium sand, little clay, gray, pedium sand, little gravel, trace	clay, dark brown	own	2.0	11.5 30.0
		10-		SILT; som	ne fine to me on odor. he fine to me hydrocarbon	edium sand, little gravel, broy	vn, dry, petroleum		0.4	116
						AND SILT; little gravel, litt			0.5	
		15—		1					1.4	
		-			*			clay,	1.0	
		20—		SILT AND	CLAV. com	ome silt; little clay, brown, we fine to medium sand, some			1.7	
				SILT AND (-19.6. CLAY; some	e gravel, little fine to medium	yer at 19.1-19.2 and sand, presence of fi	clay	1.0	35.8
		-		SILT AND C free product.	CLAY; some	e fine to medium sand, little g	ravel, wet, presence	of	2.0	213
substrata desc	ription	s above	are	SILT AND C	LAY; some	fine to medium sand, some and based upon visual/manu	gravel, gray, wet, pro	esence	1.1	269

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01009.02

Date 2002

Log of Well

LOG OF BOREHOLE

Figure

See "I egend to I age!	08/02 for	Drilling Cont Parratt-W Inc. Boring	olff,	Project Name: Sunoco, Inc. cus Hook Refinery, PA	Method/Equip Hollow Stem Split Spoo	Auger		Numb g
sampling method, classifications and lab- testing methods		Diam.(in.):	Elev.(fL):	Groundwater Depth (ft.)	Total Depth (ft.): 30.0	Drive wt.(lbs.):		St(in.)
Well Construction	Depth, (ft.)	Sample Type	free product.	Description			Recovery	PID Reading (mm)
	-	SIL free	ND, fine to coa T AND SAND product.	rse; some silt, wet, presence of , fine to medium; some grave o medium sand, some clay, tra	l, little clay, wet, pres	4	1.4	233
	30—	HIII \ROO	CK ED ACLAES	T; petroleum hydrocarbon sta medium sand, some clay, tra		1	1.5	89.5

Project No. 62SU.01009.02

Date 2002

Log of Well

. . ILIPS ISLAND, GPJ LOG OF BOREHOLE

Figure

(sheet 2 of 2)

SECOR International Incorporated

See "Legend to Logs" for sampling method, classifications and laboratory testing methods Weil Construction Bentonite Sand Dark brown-grayish brownSAND, fine to medium, some silt and gravel. Light brown-grayish brownSAND, fine to medium, some silt and gravel. Dark brown SILT, some fine to medium sand, little gravel, oily. A few pieces of plastic sheeting stained by oil coming up in the cuttings. NOTE: Likely large voids in well column from gravel or rubble, had to use significantly more sand to set well.		Drilled: 20/03		ling Con		Tens	Project Name: Philips Island		Method/Equipm			lumber:
Well Construction Bentonite Sand Dark brown SILT, some fine to medium, some silt and gravel. Dark brown SILT, some fine to medium sand, little gravel, oily. A few pieces of plastic sheeting stained by oil coming up in the cuttings. NOTE: Likely large voids in well column from gravel or rubble, had to use significantly more sand to set well. Dark brown-black SILT, little fine to medium sand, little clay, wet/oily. 12	See "Legend to Logs ampling method, lassifications and la esting methods	for		oring m.(in.):	Surface	I cus		t.):	Total Depth (ft.):	Drive		
Bentonite Sand Dark brown SILT, some fine to medium sand, little gravel, oily. A few pieces of plastic sheeting stained by oil coming up in the cuttings. NOTE: Likely large voids in well column from gravel or rubble, had to use significantly more sand to set well. Dark brown-black SILT, little fine to medium sand, little clay, wet/oily.	Well		Sample Type				Descripti	ion	i			PID Reading (ppm)
30—	Sand	20-		I P	Dark brown SI plastic sheeting NOTE: Likely significantly mo	LT, stai larg	some fine to medium saned by oil coming up in the voids in well column frand to set well.	nd, littl the cut rom gr	le gravel, oily. A tings. avel or rubble, h	A few pieces	of	4.1

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Project No. 62SU.01009.02

Date 03/19/2004

Log of Well

PHILIPSISLAND.GPJ LOG OF BOREHOLE

Figure



10/2	Drilled: 20/03		ing Cont		Project Name: Philips Island	Method/Equip		Well Nu	
CY 10/2 See "Legend to Logs" sampling method, classifications and lab testing methods	for oratory	Boi	L. Myering L.(in.):	Surface Elev.(ft.):	s Hook, Pennsylvania Groundwater Depth (fi	Hollow Stem Total Depth (ft.): 30.0	Drive wt.(lbs.);	Dr. Dist.	
Well Construction	Depth, (ft.)	Sample Type		2	Descripti	on			PID Reading (ppm)
Bentonite Sand					fine to medium sand, litt				0.8
4" PVC Schedule 40	5					×			4.:
	10-		Bi	ack SILT, some	clay and fine to medium s	and.			10
	15-								
	20-		BI	ack SILT, some	clay, little fine sand, wet.		*		18
	25-		D	ark gray CLAY,	some silt.				28
*	30-		Lo	og developed from	n drill cuttings.				46

Project No. 62SU.01009.02

Date 03/19/2004

Log of Well

PHILIPSISLAND.GPJ LOG OF BOREHOLE

Figure



See Legal to Logs for plane Dimm Surface Groundwater Depth (ft.): Total Drive Dist. (it.): Depth (ft.): De	.	Drilled: 20/03		lling Con B.L. My		Marcu	Project Name: Philips Island s Hook, Pennsylvania		Method/Equipm		Well No	
Well Construction Bentonite Sand 4" PVC Schedule 40 Dark brown-black SLT, little fine to medium sand, trace gravel, oily/wet. Gray CLAY, some silt, wet/oily.	See "Legend to Logs sampling method, classifications and la esting methods	for boratory		oring m.(in.):	S	urface		(ft.):	Total Depth (ft.):	Drive		rop (in.):
Sand 4" PVC Schedule 40 Dark brown-black SILT, little fine to medium sand, trace gravel, oily/wet. Gray CLAY, some silt, wet/oily.		Depth, (ft.)	Sample Type				Descrip	tion				PID Reading (ppm)
20—	Sand			1	Dark br	own-black	SILT, little fine to med			oily/wet.		10
					93	z ·						
30-		25-							201,000	san.		35

Project No. 62SU.01009.02

Date 03/19/2004

Log of Well

PHILIPSISLAND.GPJ LOG OF BOREHOLE Figure

SECOR International Incorporated

See "Legend to Logs" for James (in.); Boring ampling method. Well Construction Bentonite Sand Gray SILT. Gray CLAY, some fine to medium sand and silt. Gray CLAY, little silt, oily.	CY	ate Drilled: 10/21/03		ling Contra		Project Name: Philips Island s Hook, Pennsylvania	Method/Equipment: Hollow Stem Auger	Well Nu	
Bentonite Sand Gray, fine to medium SAND, some silt. Gray CLAY, some fine to medium sand and silt. Gray CLAY, little silt, oily.	ce "Legend to Lo ampling method, lassifications and			oring m.(in.);): Total Drive Depth (ft.): wt.(lbs.)		op (in.):
Bentonite Sand Gray, fine to medium SAND, some silt. Gray CLAY, some fine to medium sand and silt. Gray CLAY, little silt, oily.		Depth, (ft.)	Sample Type			Descriptio	n		PID Reading (mm)
1.10	Sand	5-e 40		Gra Gra	y, fine to media	fine to medium sand and s	ilt.		4.

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01009.02

Date 03/19/2004

Log of Well

PHILIPSISLAND,GPJ LOG OF BOREHOLE

Figure

SECOR.

Logged By: Date D CY 10/2	1		ling Cor		Marcus	Project Name: Philips Island s Hook, Pennsylvania		Method/Equipm		Well Nu MW-	
See "Legend to Logs" is sampling method, classifications and labor testing methods	for pratory		oring m.(in.):	S	urface ev.(ft.):	Groundwater Depti		Total Depth (ft.): 30.8	Drive wt.(lbs.):	Dr. Dist.	op (in.);
Well Construction	Depth, (ft.)	Sample Type	, sti	MIL.7	'	Descri	ption		W		PID Reading (ppm)
Bentonite Sand 4" PVC Schedule 40	5 10 15 20			Black S Dark gr	ILT, some	fine to medium sand, little silt, oily.					0.2
39 85		-		Log de	veloped fro	m drill cuttings.					1.3

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01009.02

Date 03/19/2004

Log of Well

PHILIPSISLAND.GPJ LOG OF BOREHOLE Figure

SECOR International Incorporated

Logged By:	Date Dri	- 1		ling Con		M	Project Name: Philips Island		Method/Equipm		Well N	
CY lee "Legend to ampling meth- lassifications esting method	10/21/ Logs" food, and labores	r atory		3.L. My oring m.(in.): 8		urface ev.(fl.):	s Hook, Pennsylvania Groundwater Depth (1	l t.):	Total Depth (ft.): 30.0	Drive wt.(lbs.):		rop .(in.):
Well Construct	ion	Depth, (ft.)	Sample Type				Descript					PID Reading (ppm)
Bento Sand 4" PV Sched		10— 15— 20—			Black S	LT, some b	clay and fine to medium salt, trace fine to medium	sand.				8.4
		30	-		Log de	veloped fro	m drill cuttings.					4.

The substrata descriptions above are generalized representations and based upon visual/manual classification of cuttings and/or samples obtained during drilling. Predominant material types shown on the log may contain different materials and the change from one predominant material type to another could be different than indicated. Descriptions on this log apply only at the specific location at the time of drilling and may not be representative of subsurface conditions at other locations or times.

Project No. 62SU.01009.02

Date 03/19/2004

Log of Well

PHILIPSISLAND.GPJ LOG OF BOREHOLE

Figure

(sheet l of l)

LOCATION:

Sunoco Marcus Hook Refinery, Post Road

DATE:

17 January, 2000

GEOLOGIST:

James Mulry, P.G.

DRILLER:

B. L. Myers Bros., Inc., Glenmoore, PA

METHOD:

Earthprobe®, 2" Core barrel

CONSTRUCTION:

5' X 1.5" Schedule 40 PVC Screen (0.020" Slot), 5' X 1.5"

Sch 40 PVC Pipe;

DEPTH	DESCRIPTION	9, TOTAL DEPTH 8'
0-0.5'	Coarse fill	COMMENTS
0.5'-3'		Sandy gravel
	Slightly very fine sandy brown clay	Increasing and coarsening sand
3'-8'	Slightly clayey fine to medium gray sand	downward, gradational color change

	A 01-5
	10W-01259
	MW-010-
- '	

DEPTH	DESCRIPTION	TOTAL DEPTH 8'
0-0.5'	Coarse fill	COMMENTS
0.5'-2'	Slightly very fine sandy	Sandy gravel
	brown clay	I gradational color change
2'-6'	Slightly very fine sandy gray clay	Increasing and coarsening sand down
6'-8'	Slightly clayey fine to medium gray sand	gradational change to lower unit

DEPTH	DESCRIPTION	TOTAL DEPTH 8'
0-0.5'	Coarse fill	COMMENTS
0.5'-2'	Slightly very fine sandy	Sandy gravel
-	brown clay	gradational color change
2'-6'	Slightly very fine sandy gray	
	clay	Increasing and coarsening sand down,
6'-8'	Fine to medium gray sand	gradational change to lower unit

LOCATION:

Sunoco Marcus Hook Refinery, Post Road

DATE:

17 January, 2000

GEOLOGIST:

James Mulry, P.G.

DRILLER:

B. L. Myers Bros., Inc., Glenmoore, PA

METHOD:

Earthprobe®, 2" Core barrel

CONSTRUCTION:

5' X 1.5" Schedule 40 PVC Screen (0.020" Slot), 5' X 1.5"

Sch 40 PVC Pipe;

DEPTH	DESCRIPTION	9, TOTAL DEPTH 8'
0-0.5'	Coarse fill	COMMENTS
0.5'-3'		Sandy gravel
	Slightly very fine sandy brown clay	Increasing and coarsening sand
3'-8'	Slightly clayey fine to	downward, gradational color change
	medium gray sand	

DEPTH	DESCRIPTION	TOTAL DEPTH 8'
0-0.5'	Coarse fill	COMMENTS
0.5'-2'	Slightly very fine sandy brown clay	Sandy gravel I gradational color change
2'-6'	Slightly very fine sandy gray	Increasing and coarsening and de-
6'-8'	Slightly clayey fine to medium gray sand	gradational change to lower unit

DEPTH	DESCRIPTION DESCRIPTION	TOTAL DEPTH 8'
0-0.5'	Coarse fill	COMMENTS
0.5'-2'	Slightly very fine sandy	Sandy gravel
	brown clay	gradational color change
2'-6'	Slightly very fine sandy gray	1
	Clay	Increasing and coarsening sand down
6'-8'	Fine to medium gray sand	gradational change to lower unit

LOCATION:

Sunoco Marcus Hook Refinery, Post Road

DATE:

17 January, 2000

GEOLOGIST:

James Mulry, P.G.

DRILLER:

B. L. Myers Bros., Inc., Glenmoore, PA

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Earthprobe®, 2" Core barrel

CONSTRUCTION:

5' X 1.5" Schedule 40 PVC Screen (0.020" Slot), 5' X 1.5"

Sch 40 PVC Pipe;

DEPTH	DESCRIPTION	9, TOTAL DEPTH 8'
0-0.5'	Coarse fill	COMMENTS
0.5'-3'	Slightly very fine sandy	Sandy gravel
	brown clay	Increasing and coarsening sand
3'-8'	Slightly clayey fine to	downward, gradational color change
	medium gray sand	

DEPTH	DESCRIPTION	TOTAL DEPTH 8'
0-0.5'	Coarse fill	COMMENTS
0.5'-2'		Sandy gravel
	Slightly very fine sandy brown clay	I gradational color change
2'-6'	Slightly very fine sandy gray clay	Increasing and coarsening sand down
6'-8'	Slightly clayey fine to medium gray sand	gradational change to lower unit

DEPTH	BURING B-61,	TOTAL DEPTH 8'
0-0.5'	DESCRIPTION	COMMENTS
	Coarse fill	Sandy gravel
0.5'-2'	Slightly very fine sandy brown clay	gradational color change
2'-6'	Slightly very fine sandy gray	Increasing and coarsening sand down
6'-8'	Fine to medium gray sand	gradational change to lower unit

LOCATION:

Sunoco Marcus Hook Refinery, Post Road

DATE:

17 January, 2000

GEOLOGIST:

James Mulry, P.G.

DRILLER:

B. L. Myers Bros., Inc., Glenmoore, PA

METHOD:

Earthprobe®, 2" Core barrel

CONSTRUCTION:

5' X 1.5" Schedule 40 PVC Screen (0.020" Slot), 5' X 1.5"

Sch 40 PVC Pipe;

BORING B-62, TOTAL DEPTH 8'		IOTAL DEPTH 8'
DEPTH	DESCRIPTION	COMMENTS
0-0.5'	Coarse fill	Sandy gravel
0.5'-2'	Slightly very fine sandy brown clay	gradational color change
2'-6'	Slightly very fine sandy gray	Increasing and coarsening sand down gradational change to lower unit
6'-8'	Fine to medium gray sand	graduorial charge to lower unit

AOI-5 MW-018 B62

DEPTH	DECOMPTE	TOTAL DEPTH 8'
	DESCRIPTION	COMMENTS
0-0.5'	Coarse fill	Sandy gravel
0.5'-3'	Slightly very fine sandy brown clay	January graver
3'-7'	Slightly very fine sandy brown clay	Increasing and coarsening sand down gradational change to lower unit
7'-8'	Clayey fine to medium gray sand	graduotial change to lower unit

	THE PARTY OF THE P	BORING B-16, TOTAL DEPTH 9
DEPTH	DESCRIPTION	COMMENTS
0-4'	Slightly very fine sandy gray clay	COMMENTS
4'-8'	Clayey fine to medium gray sand	Increasing and coarsening sand downward, gradational change
8'-9'	Weathered gneiss	Refusal at 9'

1 2w-147

LOCATION:

Sunoco Marcus Hook Refinery, Post Road

DATE:

17 January, 2000

GEOLOGIST:

James Mulry, P.G.

DRILLER:

B. L. Myers Bros., Inc., Glenmoore, PA

METHOD:

Earthprobe®, 2" Core barrel

CONSTRUCTION:

5' X 1.5" Schedule 40 PVC Screen (0.020" Slot), 5' X 1.5"

Sch 40 PVC Pipe;

BORING B-62, TOTAL DEPTH 8'		
DEPTH	DESCRIPTION	COMMENTS
0-0.5'	Coarse fill	Sandy gravel
0.5'-2'	Slightly very fine sandy brown clay	gradational color change
2'-6'	Slightly very fine sandy gray clay	Increasing and coarsening sand down gradational change to lower unit
6'-8'	Fine to medium gray sand	g. a satisfied of lower unit

A01-5 MW-018 B62

BORING B-63, TOTAL DEPTH 8'		TOTAL DEPTH 8'
DEPTH	DESCRIPTION	COMMENTS
0-0.5	Coarse fill	Sandy gravel
0.5'-3'	Slightly very fine sandy brown clay	Garray graver
3'-7'	Slightly very fine sandy brown clay	Increasing and coarsening sand down, gradational change to lower unit
7'-8'	Clayey fine to medium gray sand	S S S S S S S S S S S S S S S S S S S

MW-01d B63

4	OBSERVATION WELL AT	BORING B-16, TOTAL DEPTH 9
DEPTH	DESCRIPTION	COMMENTS
0-4'	Slightly very fine sandy gray clay	Comments
4'-8'	Clayey fine to medium gray sand	Increasing and coarsening sand downward, gradational change
8'-9'	Weathered gneiss	Refusal at 9'

401-47 200-147



MONITORING WELL LOG: MW-433

PROJECT:

Sunoco- Marcus Hook Refinery

DRILLING CO.:

Lewis Environmental

SITE LOCATION: AOI-5

DRILLING METHOD:

Hydrovac truck

JOB NO.:

SAMPLING METHOD:

Hand auger

LOGGED BY:

Luke Mokrycki

SCREEN/RISER DIAMETER:

4"

DATES DRILLED: 5/30/13 - 5/31/13

WELLBORE DIAMETER:

14"

TOTAL DEPTH:

12.5'

ELEVATION:

Depth (feet)		USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0-		Accessive consumerous consumerous and a consumer	THE CONTRACT OF THE CONTRACT O			
	280.6		(0 - 2') Dark brown SILT and CLAY w/ small gravels	Sample taken at 0 to 2' bgs	Bentonite seal 0' - 0.5' bgs PVC riser 0 - 1.0'	
			(2' - 4') White and black, coarse SAND w/ some gray clay		bgs	
-5 —	3.7		(4' - 6') Dark gray CLAY w/ small gravels		PVC screen from 1.0' - 12.5' bgs	
	8.7		(6' - 8') Dark gray - green CLAY	Sample taken at 8 to 10' bgs	Sand pack from 0.5' to 14' bgs	
	14.8		(8' - 10') Brown - gray CLAY w/			
-10 -	66.8		small gravels			
-				Boring terminated at 14' bgs.		



MONITORING WELL LOG: MW-434

PROJECT:

Sunoco- Marcus Hook Refinery

DRILLING METHOD:

DRILLING CO .:

Lewis Environmental

SITE LOCATION: AOI-5

DIVILLING METHOD.

Hydrovac truck

JOB NO.:

SAMPLING METHOD:

Hand auger

LOGGED BY:

Luke Mokrycki

SCREEN/RISER DIAMETER:

4"

DATES DRILLED: 5/29/13

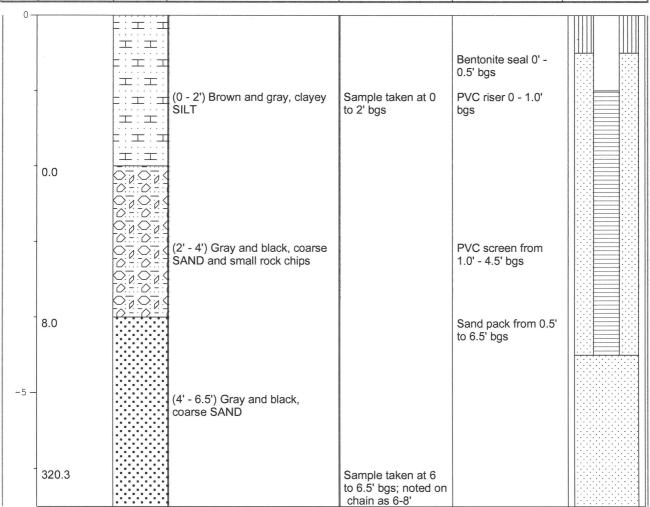
3 WELLBORE DIAMETER:

10"

TOTAL DEPTH: 4.5'

ELEVATION:

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM	PATRICINA PROPERTY AND INCIDENT
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MONITORING WELL LOG: MW-435

PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environmental

SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck

JOB NO.: SAMPLING METHOD: Hand auger

LOGGED BY: Luke Mokrycki SCREEN/RISER DIAMETER: 4"

DATES DRILLED: 7/31/13 - 8/1/13 WELLBORE DIAMETER: 10"

TOTAL DEPTH: 10' ELEVATION:

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0 -	182.8		Shiny, dark, black tar covered Gravel and Silt.	Sample taken at 0 to 2' bgs	Bentonite 0' to 0.5' bgs Sand Pack from 0.5' to 10' bgs	
-	55.6		Dark gray Clay		bgs	
-5	105.3		Dark gray-black Clay			
-	72.3		Brown-gray Clay		PVC Screen 1' to 10'	
_10 _			Black Clay	Sample taken at 8 to 10' bgs	bgs	



MONITORING WELL LOG: MW-436

PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environ.

SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck

JOB NO.: SAMPLING METHOD: Hand auger

LOGGED BY: Luke Mokrycki SCREEN/RISER DIAMETER: 4"

DATES DRILLED: 5/14/13 WELLBORE DIAMETER: 10"

TOTAL DEPTH: 5' ELEVATION:

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
			Light brown clay, loose w small gravels.	Sample taken at 0 to 2' bgs	Bentonite seal 0 to 1' bgs PVC riser 0 tp 1' bgs	
-	10.5		Brown and gray, fine sands (oily sheen)	Sample taken at 4 to 6' bgs	PVC screen 1 to 5' bgs	
-5 -	81		Brown sands, wet, oily sheen. Bedrock	Hydroexcavated to 6' bgs Refusal due to bedrock at 6' bgs	Sand Pack 1 to 5' bgs	



MONITORING WELL LOG: MW-437

PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environ./Total Quality Drilling

SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck/Hollow stem auger

JOB NO.: SAMPLING METHOD: Hand auger/Split spoon

LOGGED BY: Luke Mokrycki/Noelle Stroik SCREEN/RISER DIAMETER: 4"

DATES DRILLED: 6/27/13 WELLBORE DIAMETER: 10"

TOTAL DEPTH: 8' ELEVATION:

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
-	167		Light brown-tan fine Sand w/ small gravels. Medium brown, Silty Clay.	Sample taken at 0 to 2' bgs Sample taken at 6 to 8' bgs	PVC Riser 0 to 1' bgs	
-5 -	218		Dark brown - red, fine Sands (Oily Sheen) Gray Sands and brown Silt, wet.	Hydroexcavated to 8' bgs	Sand Pack from 1' to 8' bgs PVC Screen 1' to 8'	
				bedrock at 8' bgs	bgs	



MONITORING WELL LOG: MW-438

PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.:

Lewis Environ./Total Quality Drilling

SITE LOCATION: AOI-5

DRILLING METHOD:

Hydrovac truck/Hollow stem auger

JOB NO.:

SAMPLING METHOD:

Split spoon

10"

LOGGED BY:

Noelle Stroik

SCREEN/RISER DIAMETER: 4"

DATES DRILLED: 6/27/13

WELLBORE DIAMETER:

TOTAL DEPTH: 14.5'

ELEVATION:

WELL WELL

Depth (feet)		uscs	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0 -	281		(0 - 2') Fine brown Sands with small Gravels	Sample taken at 0 to 2' bgs	PVC Riser 0 to 0.5' bgs, plus stick-up	
			(2' - 4') Fine, dark gray Sands	Sample taken at 4 to 6' bgs		
-5 —	2999		(4' - 6') Fine dark gray Sands		Sand Pack from 0.3' to 15' bgs	
	2999/OVR					
	105.7		(6' - 8') Medium brown, sandy Clay; small Gravels, Strong odor.	Hydroexcavated to 10' bgs	PVC Screen 0.5' to 14.5' bgs	
-10 -	220.6		(8' - 10') Rusty orange Silt and dark brown Sands, wet.	Sample taken at 8 to 10' bgs		
	56.2		(10' - 12') Brown, orange brown, gray, black Sandy Silt w/ some gravel, moist, slight Pero-Ilike odor.	HSA from 10' - 15' bgs		
-15 —	28.7		(12' - 14') Same as above. (14' - 15') Brown, orange brown Sandy Silt, little Clay, moist, no odor.	Boring terminated at 15' bgs.		



WELL CONSTRUCTION SUMMARY

Well No. MW-439

				Well No. IVI			
Project	Marcus Hook Industrial Co	mplex		Project No.		257	4601
Location	AOI5		Elevation And	d Datum	10	0.827	
Drilling Agency	Lewis Environmental		Date Started	5/8/13	Date Finished 5	/8/13	
Drilling Equipmen	t Hydrovac Truck			Driller		Paul	Riale
Size And Type of	Bit 10 inch			Inspector		Patrick	Trov
Method of Installa Hydrovac ex	tion cavate to 12' bgs. Install 10 foot 4"	diameter screen and	d 2 foot 4" diam	eter riser. Bad	ckfill anulus of well w		
	nite hole plug seal to grade.			Note Initial 10 seal, 4 fc	foot screen, 11 foot	t filter pack, 1 foot b	entonite
Type of Casing	Diameter		Type of Backfill	concrete Material	pad at surface.	Toot screen, To look	
PVC Type of Screen	4" Diameter		Filter Sa				
Slotted	4"		Bentonite	Э			
Borehole Diamete	18 "		Type of Filter M Filter Sa				
Top of Casing	Elevation 14.91'	Depth 4.09' ags	1 ' '	ell Details	Soil / Rock	Classification	Depth (ft)
Top of Seal	Elevation	Depth		oncrete Pad ter Sand	sandy SILT, dark g	rey, odor	-
Slotted Borehole Diamete Top of Casing Top of Seal Top of Filter Top of Screen	Elevation 10.83'	Depth 0' bgs					_ 1
Top of Screen	Elevation 10.58'	Depth 0.25' bgs					2
Bottom of Filter	Elevation 0.83'	Depth 10' bgs			Clayey SILT, some	ecobbles	
Bottom of Well	Elevation	Depth 10' bgs					<u> </u>
Screen Length	9.8'	Slot Size 10 Slot					- 4
	GROUNDWATER ELEVATIO	ONS (ft)					- - - 5
Elevation	DTW	Date		reen			-
Elevation	DTW	Date			large rounded cobb	oles and GRAVEL,	6
Elevation	DTW	Date					- - 7
Elevation	DTW	Date			sandy CDAVEL or	ome rounded cobbles,	8
Elevation	DTW	Date			trace clayey silt	ome rounded copples,	-
Bottom of Filter Bottom of Well Screen Length Elevation Elevation Elevation Elevation Elevation	DTW	Date					- 9 - - -



MONITORING WELL LOG: MW-440

PROJECT:

Sunoco- Marcus Hook Refinery

DRILLING CO.:

Lewis Environmental

SITE LOCATION: AOI-5

DRILLING METHOD:

Hydrovac truck

JOB NO.:

SAMPLING METHOD:

Hand auger

LOGGED BY:

Luke Mokrycki

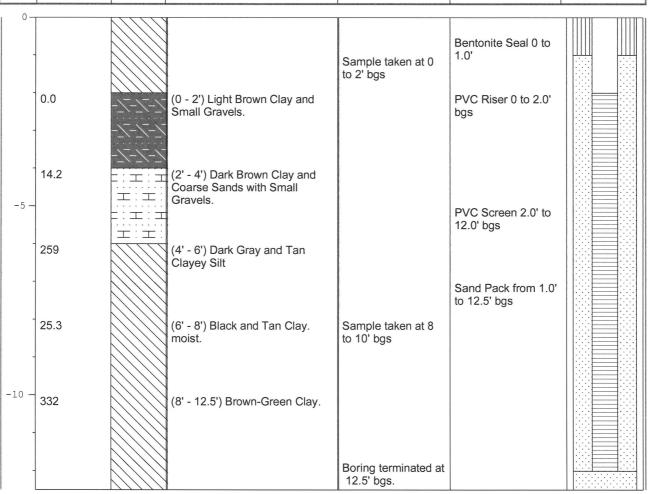
DATES DRILLED: 5/8/13 - 5/9/13

SCREEN/RISER DIAMETER: WELLBORE DIAMETER:

10"

TOTAL DEPTH: 12' **ELEVATION:**

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
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MONITORING WELL LOG: MW-441

PROJECT:

Sunoco- Marcus Hook Refinery

13'

SITE LOCATION: AOI-5

JOB NO.: LOGGED BY:

Luke Mokrycki

DATES DRILLED: 5/15/13

TOTAL DEPTH:

DRILLING CO .:

DRILLING METHOD:

SAMPLING METHOD:

SCREEN/RISER DIAMETER: 4"

WELLBORE DIAMETER:

ELEVATION:

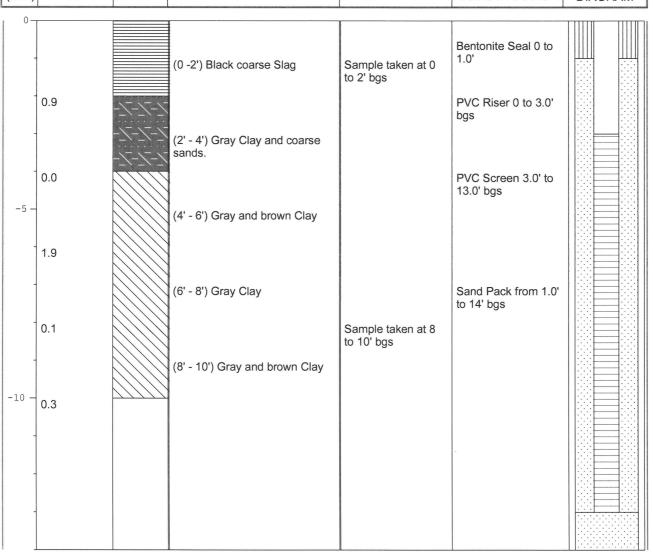
Hand auger

Lewis Environ.

Hydrovac truck

10"

Depth OVM WELL WELL **USCS** LITHOLOGY COMMENTS (ppm) (feet) CONSTRUCTION **DIAGRAM**





MONITORING WELL LOG: MW-442

PROJECT:

Sunoco- Marcus Hook Refinery

DRILLING CO.:

Lewis Environmental

SITE LOCATION: AOI-5

DRILLING METHOD:

Hydrovac truck

JOB NO.:

SAMPLING METHOD:

Hand auger

LOGGED BY:

Evan Ellewanger

SCREEN/RISER DIAMETER:

4"

DATES DRILLED: 5/29/13

WELLBORE DIAMETER:

10"

TOTAL DEPTH:

12'

ELEVATION:

Depth (feet)		USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
-	0.2		(0 - 2') dark brown / green silty CLAY, gravels, dry (2' - 4') brown / tan clayey SILT,	Sample taken at 0 to 2' bgs *no odor	Bentonite seal 0' - 0.1' bgs	
-5 —	5.2		fine gravel; slightly moist (4' - 6') brown / tan, clayey SILT, very fine gravel; slightly	*slight odor		
-	5.3		moist (6' - 8') brown clayey - SILT, little, fine gravel; moist	Sample taken at 6 to 8' bgs *strong odor	Sand pack from 0.1' to 16' bgs	
-	252		(8' - 10') brown silty CLAY, fine	*slight odor	PVC screen from 0'	
-10 -	9.3		gravels, wet		to 12' bgs	
-15 -						



Well No MW-443

		, ,			Well No. IVIVV-443			
	Project	Marcus Hook Industrial C	Complex		Project No.		2	2574601
	Location	AOI5			Elevation And	l Datum		24.028
,	Drilling Agency	Lewis Environmental			Date Started	5/10/13	Date Finished	5/10/13
MMAR	Drilling Equipment	Hydrovac Truck			Driller		Pa	ul Riale
UON_SU	Size And Type of E	Bit 10 inch			Inspector		Patr	ick Troy
Report: Log - LANGAN_WELL_CONSTRUCTION_SUMMARY	Method of Installat Hydrovac exc Install bentor	ion cavate to 13.5' bgs. Install 10 foc hite hole plug seal to grade.	t 4" diameter screen a	nd 5 foot 4" dia	meter riser. Ba	ackfill anulus of wel	ll with filter sand	to 2' bgs.
ort: Log - L								
11/19/2015 11:10:57 AM Rep	Method of Well De	velopment			Note 10 foot s sand filte	creen, 4 inch diamer, 2 foot bentonite s	eter, 6 foot riser, seal	12 foot
/19/2015	Type of Casing PVC	Diameter 4 "		Type of Backfill Filter Sa				
13.GPJ	Type of Screen Slotted Borehole Diameter	Diameter 4"		Type of Seal Ma Bentonite)			
6_24_	Boronole Blameter	18"		Filter Sa				
3 LOGS	Top of Casing	Elevation 26.78'	Depth 2.75' ags	V W	ell Details	Soil / Rock	Classification	Depth (ft)
BORING	Top of Seal	Elevation 24.03'	Depth 0' bgs			Sandy GRAVEL, o	dark grey	
3S/GINT	Top of Filter	Elevation 22.03'	Depth 2' bgs	 ⊸Be	ntonite			<u> </u>
GINTLO	Top of Screen	Elevation 20.03'	Depth 4' bgs			Clayey SILT, trace	subangular gravel	2
MENTAL\	Bottom of Filter	Elevation 10.03'	Depth 14' bgs		ter Sand			- 3 - - - - 4
NVIRON	Bottom of Well	Elevation	Depth 14' bgs					5
DATA/E	Screen Length	10.0'	Slot Size 10 Slot					6
EERING		GROUNDWATER ELEVAT (Measured from the Top of Ca	TIONS (ft)					7
/ENGIN	Elevation 14.01'	DTW 12.77'	Date 8/12/2013			silty GRAVEL, cob	phles	<u></u> 8
0027801	Elevation	DTW	Date	- Sc	reen	Sity SIVIVEE, COL		9
ATA8\22\	Elevation	DTW	Date					10
TA\DT\D,	Elevation	DTW	Date					11
COMIDA	Elevation	DTW	Date			silty SAND, some	gravel	12
INLANGAN.COMIDATAIDTIDATA8\220027801\ENGINEERING DATA\ENVIRONMENTAL\GINTLOGS\GINT BORING LOGS_	Elevation	DTW	Date					13



PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environmental

SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck

JOB NO.: SAMPLING METHOD: Hand auger

LOGGED BY: Luke Mokrycki SCREEN/RISER DIAMETER: 4"

DATES DRILLED: 7/30/13 - 7/31/13 WELLBORE DIAMETER: 14"

TOTAL DEPTH: 13' ELEVATION:

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0-		$\wedge \wedge \wedge \wedge$				
-		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	dark brown CLAY, silt, and fill	Sample taken at 0 to 2' bgs	Bentonite seal 0' - 2.0' bgs	
-	1.8		light brown CLAY and silt		PVC riser 0 - 2.5' bgs	
-	39.2		Ingrit brown ocal and sut			
-5 —			light brown CLAY and silt			
-	131.5			Sample taken at 4 to 6' bgs	Sand pack from 2.0' to 13' bgs	
-	7.5		light brown, clayey SILT			
-			brown and gray CLAY		PVC screen from 2.5' - 13' bgs	
-10 —	4.5					
-						



Well No MW-445

_					Well No. IVIVV-445				
F	Project	Marcus Hook Industrial (Complex		Project No.		257	4601	
L	ocation	AOI5			Elevation And	d Datum	20).941	
	Orilling Agency	Lewis Environmental			Date Started	5/14/2013	Date Finished 5/14/	2013	
Y E	Orilling Equipment	Hydrovac Truck			Driller		Paul	Riale	
7 S	Size And Type of E	Bit 10 inch			Inspector		Patrick	Trov	
	Method of Installat	ion							
	Install bentor	eavate to 15' bgs. Install 10 foot lite hole plug seal to grade.			Note			-	
MA / C:01:11 C		·				iser, 13 foot sand fi	Iter, 2 foot bentonite	e seal	
18/50	Type of Casing PVC	Diameter 4"	•	Type of Backfill Filter Sa					
- - - -	ype of Screen	Diameter 4"	-	Type of Seal Ma					
5 F	Slotted Borehole Diameter			Bentonite Type of Filter M					
		18"		Filter Sa					
T 25	op of Casing	Elevation 24.44'	Depth 3.5' ags	I w	ell Details	Soil / Rock	Classification	Depth (ft)	
T SCRIP	op of Seal	Elevation 20.94'	Depth 0' bgs			Fill		-	
LOGS/GIN BORING LOGS 6 24 T	op of Filter	Elevation 18.94'	Depth 2' bgs	■ Be	entonite			F 1	
	op of Screen	Elevation 15.94'	Depth 5' bgs					2	
MENIALIG	Bottom of Filter	Elevation 5.94'	Depth 15' bgs	− X3 X3 ₹ Fi	ter Sand	USCS Low Plastic	ity Clay	3	
NONIKON	Bottom of Well	Elevation	Depth 15' bgs					5	
DAIA	Screen Length	10.0'	Slot Size 10 Slot					6	
LEEKING L		GROUNDWATER ELEVAT	TIONS (ft)			USCS Low Plastic	ity Clay	7	
E E	Elevation 20.14'	DTW 4.3'	Date 8/12/2013					<u> </u>	
108/200	Elevation	DTW	Date		creen	Fill		9 10	
AI A8/22	Elevation	DTW	Date		a CCII			E 10	
I A D I L	Elevation	DTW	Date					12	
A E	Elevation	DTW	Date					13	
ALANGAN.COMIDATANITANIAN SIZZOUZ/8011ENGINEEKING DATAIENVIKONMENTALIGIN III III III III III IIII IIII IIII	Elevation	DTW	Date					14	



PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environmental

SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck

JOB NO.: SAMPLING METHOD: Hand auger LOGGED BY: Luke Mokrycki & Evan Ellwanger SCREEN/RISER DIAMETER: 4"

DATES DRILLED: 5/28/13 & 5/29/15

WELLBORE DIAMETER: 10"

TOTAL DEPTH: 18' ELEVATION:

Depth (feet)		USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
-	14.9		Light to medium brown, silty CLAY	Sample taken at 0 to 2' bgs	Bentonite seal 0' - 2.5' bgs PVC riser 0 - 5' bgs	
-	5.9		Light brown CLAY w/ small gravels			
-5 -	24.6		Dark gray, sandy CLAY		Sand pack from 2.5' to 18' bgs	
-	39.8	0.70.78 0.50.5 0.70.78 0.50.5	Light gray SAND Orange - brown SAND w/ small	Sample taken at 8		
-10 -	47.4	0.7 0.7 K	gravels	to 10' bgs	PVC screen from 5' to 18' bgs	
-						
-15 -						



MONITORING WELL LOG: MW-447

PROJECT:

Sunoco- Marcus Hook Refinery

DRILLING METHOD:

Lewis Environmental

SITE LOCATION: AOI-5

Hydrovac truck

JOB NO.: LOGGED BY: SAMPLING METHOD:

DRILLING CO .:

Hand auger

DATES DRILLED: 5/16/13

Luke Mokrycki

SCREEN/RISER DIAMETER:

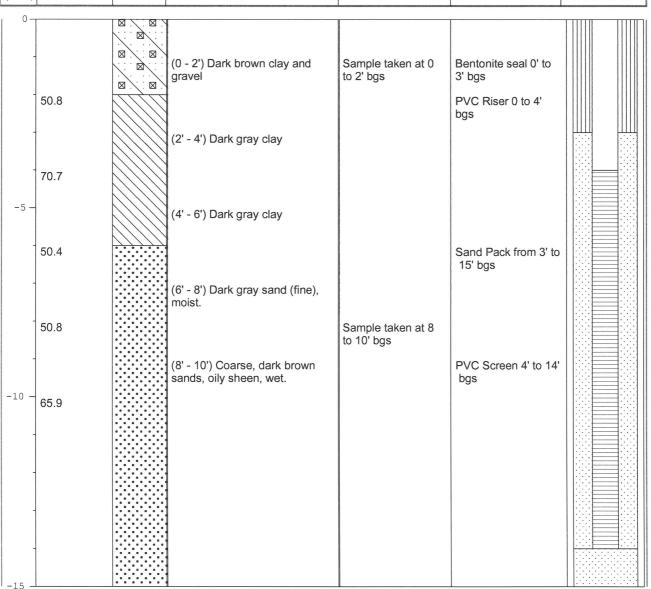
4"

WELLBORE DIAMETER:

10"

TOTAL DEPTH: 14' **ELEVATION:**

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
--------------	--------------	------	-----------	----------	----------------------	-----------------





Well No MW-448

		1		Well No. IVIVV-440				
Project	Marcus Hook Industrial C	Complex		Project No.		2574	4601	
Location	AOI5			Elevation And	l Datum	17	'.157	
Drilling Agen	Lewis Environmental			Date Started	5/20/2013	Date Finished 5/20/2	2013	
Drilling Equip	ment Hydrovac Truck			Driller		Paul f	Riale	
Size And Typ	e of Bit 10 inch			Inspector		Patrick	Trov	
Method of In:			10.75 / 48 8		D 160 1 6			
Drilling Equip	entonite hole plug seal to grade.			motor cooling.			,	
Method of W Type of Casi PVC Type of Scre Slottec	ell Development			Note 2 foot ris	er, 10.5 foot sand fi	Iter, 2 foot bentonite	seal	
Type of Casi	ng Diameter 4"		Type of Backfill I Filter Sar					
Type of Scre			Type of Seal Ma					
Slottec			Bentonite Type of Filter Ma					
	18"		Filter Sar					
Top of Casin Top of Seal Top of Filter Top of Scree	g Elevation 19.16'	Depth 2' ags	Ŭ∏ W	ell Details	Soil / Rock	Classification	Depth (ft)	
Top of Seal	Elevation 17.16'	Depth 0' bgs			USCS Sandy Silt		+	
Top of Filter	Elevation 15.16'	Depth 2' bgs	— ■Be	ntonite			- 1 - 1	
Top of Scree	n Elevation 13.66'	Depth 3.5' bgs			USCS Silt		2	
Bottom of Fil	ter Elevation 4.66'	Depth 12.5' bgs	Tin in the second of the seco	er Sand			3	
Bottom of W	ell Elevation	Depth 12.5' bgs					4	
Screen Leng	th 9.0'	Slot Size 10 Slot					5	
	GROUNDWATER ELEVAT (Measured from the Top of Car	IONS (ft)					6	
Elevation 10.46'	DTW 8.7'	Date 8/12/2013					7	
Elevation	DTW	Date	Sc	reen			8	
Elevation	DTW	Date					9	
Elevation	DTW	Date					10	
Elevation	DTW	Date					11	
Bottom of File Bottom of Wild Screen Leng Elevation 10.46' Elevation Elevation Elevation Elevation Elevation Elevation Elevation	DTW	Date					12	



PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environmental

SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck

JOB NO.: SAMPLING METHOD: Hand auger

LOGGED BY: Luke Mokrycki SCREEN/RISER DIAMETER: 4"
DATES DRILLED: 5/16/13 WELLBORE DIAMETER: 10"

TOTAL DEPTH: 13' ELEVATION:

1017	AL DEPTH:	13'		VATION:			
Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM	
0 -			Gray, dark gray silt and clay.	Sample taken at 0 to 2' bgs			
-	0.9 32.8		Dark brown clay.		PVC Riser 0 to 3' bgs Sand Pack from 2' to		
-5	44.6		Light tan sand and gravel.		13' bgs		
-	75.8		Brown gray clay (metallic).	Sample taken at 8 to 10' bgs	PVC Screen 3' to 13' bgs		
-10 -	180.0		Gray and brown clay (metallic).		J		



MONITORING WELL LOG: MW-450

PROJECT: Sunoco- Marcus Hool

Sunoco- Marcus Hook Refinery DRILLING CO.:

Lewis Environmental

SITE LOCATION: AOI-5

DRILLING METHOD:

Hydrovac truck

JOB NO.:

SAMPLING METHOD:

Hand auger

LOGGED BY:

Luke Mokrycki SCREEN/RISER DIAMETER:

4"

DATES DRILLED: 5/24/13

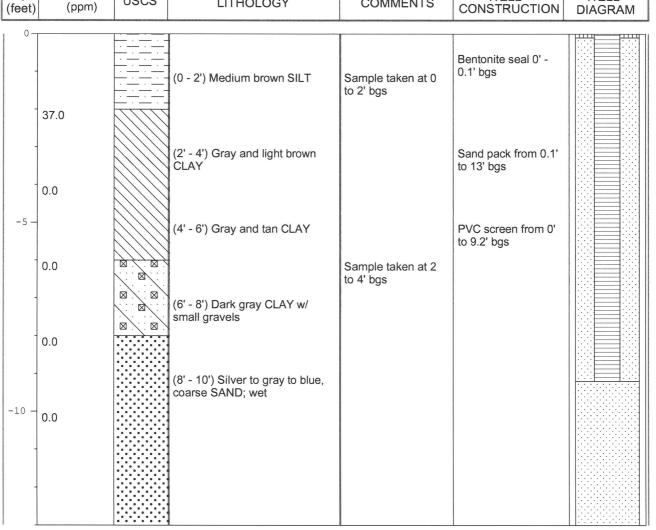
WELLBORE DIAMETER:

10"

TOTAL DEPTH: 9.2'

ELEVATION:

AND DESCRIPTION OF THE PARTY OF		VICTORIAN CONTRACTORIAN CONTRA		NAME AND ADDRESS OF THE PARTY O		
Depth	OVM	USCS	LITHOLOGY	COMMENTS	WELL	WELL





MONITORING WELL LOG: MW-451

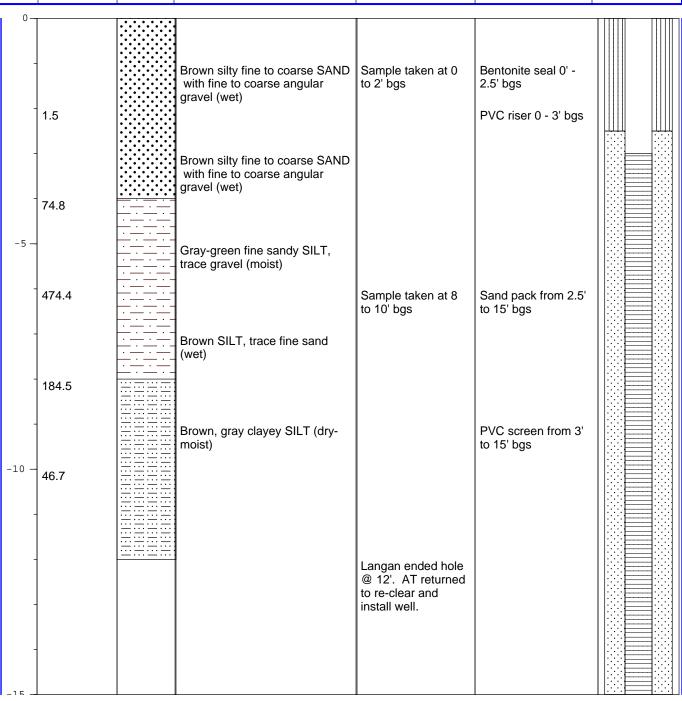
PROJECT: DRILLING CO .: **Sunoco- Marcus Hook Refinery** Lewis Environmental

SITE LOCATION: AOI-5 **DRILLING METHOD:** Hydrovac truck SAMPLING METHOD: JOB NO .: Hand auger

 $\textbf{Yavuz Gungor (boring); Evan Ellewanger (well \texttt{SCREEN/RISER DIAMETER:}}$ LOGGED BY: 4" DATES DRILLED: 5/24/13; 5/28/13 WELLBORE DIAMETER: 10"

TOTAL DEPTH: **ELEVATION:** 15'

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0_			4			





Well No. MW-452

				•	Well No. INVV-402				
	Project	Marcus Hook Industrial Co	omplex		Project No.		2574	1601	
	Location	AOI5			Elevation And	l Datum	22	.685	
Υ	Drilling Agency	Lewis Environmental			Date Started	5/24/2013	Date Finished 5/24/2	2013	
UMMAR	Drilling Equipment	Hydrovac Truck			Driller		Paul F	Riale	
CTION_S	Size And Type of E	10 inch			Inspector		Patrick	Troy	
$^{\circ}$ NLANGAN.COM/DATAIDT/DATA8/220027801/ENGINEERING DATA/ENVIRONMENTAL/GINTLOGS/GINT BORING LOGS_6_24_13.GPJ 1/1/19/2015 11:10:59 AM Report. Log - LANGAN_WELL_CONSTRUCTION_SUMMARY	Method of Installat Hydrovac exc Install bentor	ion cavate to 15.5' bgs. Install 10 foot nite hole plug seal to grade.	4" diameter screen ai	nd 10 foot 4" dia	meter riser. E	Backfill anulus of we	Il with filter sand to 2	2' bgs.	
11:10:59 AM Report:	Method of Well De	evelopment			Note 3 foot rise	er, 13.5 foot sand fil	ter, 2 foot bentonite	seal	
19/2015	Type of Casing PVC	Diameter 4"		Type of Backfill N Filter San					
3.GPJ 11/	Type of Screen Slotted	Diameter 4"		Type of Seal Mat Bentonite Type of Filter Ma	erial				
6_24_1	Borehole Diameter	18"		Filter San					
G LOGS	Top of Casing	Elevation 25.69'	Depth 3' ags	We	ell Details	Soil / Rock	Classification	Depth (ft)	
BORIN	Top of Seal	Elevation 22.69'	Depth 0' bgs			USCS Silt			
GS\GINT	Top of Filter	Elevation 20.69'	Depth 2' bgs	⋖ Ber	ntonite			1 2	
\GINTLC	Top of Screen	Elevation 17.19'	Depth 5.5' bgs			USCS Low Plasticit	ty Silty Clay	3	
MENTAL	Bottom of Filter	Elevation 7.19'	Depth 15.5' bgs	Filto	er Sand			4	
ENVIRON	Bottom of Well	Elevation	Depth 15.5' bgs			USCS Silt		5	
3 DATA\E	Screen Length	10.0'	Slot Size 10 Slot					- 6 - 7	
VEERING		GROUNDWATER ELEVATION (Measured from the Top of Casi	ng) ` ´			USCS Well-graded	Sand	8	
1/ENGI	Elevation 15.17'	DTW 10.52'	Date 8/12/2013					9	
2002780	Elevation	DTW	Date		een			10	
DATA8\2	Elevation	DTW	Date					11	
ATA\DT\	Elevation	DTW	Date					12	
COM/D,	Elevation	DTW	Date					- 13 - - - 14	
\\LANGAN	Elevation	DTW	Date					15	



PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environmental

SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck

JOB NO.: SAMPLING METHOD: Hand auger LOGGED BY: Yavuz Gungor/ LANGAN SCREEN/RISER DIAMETER: 4"

LOGGED BY: Yavuz Gungor/ LANGAN SCREEN/RISER DIAMETER: 4"

DATES DRILLED: 5/20/13 WELLBORE DIAMETER: 14"

TOTAL DEPTH: 13.67 ELEVATION:

101	AL DEPTH:	13.67	LLL	VATION:	JN:		
Depth (feet)		USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM	
			Brown fine to coarse Sandy Silt, trace fine to coarse angular gravel (moist) Grey Silt with some fine to coarse sand and fine to coarse gravel Green Silt trace fine sand (moist) Brown clayey Silt (moist-wet) Brown fine sandy Silt, trace coarse sand (wet)		Bentonite seal 0' - 2.0' bgs PVC riser 0 - 3.67' bgs Sand pack from 2.0' to 13.67' bgs		



PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environmental

SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck

JOB NO.: SAMPLING METHOD: Hand auger

LOGGED BY: Luke Mokrycki SCREEN/RISER DIAMETER: 4"

DATES DRILLED: 5/17/13, 5/20/13

WELLBORE DIAMETER: 10"

	AL DEPTH:	15.5'		VATION:	10"	
Depth (feet)	OVM	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0 -		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Dark brown Clay and gravels	Sample taken at 0 to 2' bgs	Bentonite 0' to 2' bgs	
-	1.3	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Dark gray Clay		PVC Riser 0 to 3' bgs	
-5 —	2.7	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Dark gray Clay		Sand Pack from 2' to 15.5' bgs	
-	37.9	^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^	Dark gray Sand (fine); moist.			
-	31.3	^^^^ ^^^^	Coarse, dark brown Sands, oily	Sample taken at 8	PVC Screen 3' to 15.5' bgs	
-10	PID not available	^^^ ^^^ ^^^ ^^^	sheen; wet.	to 10 [°] bgs		
-		^^^				
-15 —						



Well No. MW-455

Project					Project No.				
	Marcus Hook Industrial Complex					2574601			
Location	AOI5					d Datum	27	.560	
Drilling Agency	Lewis Environmental			Date Started	5/23/2013	Date Finished 5/23/2	2013		
Drilling Equipmen	nt Hydrovac Truck				Driller		Paul F	Riale	
Size And Type of	•				Inspector				
Method of Installa	ation						Patrick		
	xcavate to 16' bgs. Install 10 foot 4" onite hole plug seal to grade.	diameter screen and	d 10 fo	ot 4" dian	eter riser. Ba	ickfill anulus of well	with filter sand to 2' l	ogs.	
						er, 14 foot sand filte	er, 2 foot bentonite se	eal	
Type of Casing PVC	Diameter 4"			of Backfill I Iter Sar					
Type of Screen Slotted Borehole Diamete	Diameter 4"		Туре	of Seal Ma entonite	erial				
Borehole Diamete	er 18"			of Filter Ma Iter Sar					
Top of Casing	Elevation 31.56'	Depth 4' ags			ell Details	Soil / Rock	Classification	Depth (ft)	
Top of Seal	Elevation 27.56'	Depth 0' bgs				Fill	:======:		
Top of Filter	Elevation 25.56'	Depth 2' bgs		⋖ -Be	ntonite	USCS Silt		- 1 - 2	
Top of Screen	Elevation 21.56'	Depth 6' bgs				USCS Silt		3	
Bottom of Filter	Elevation 11.56'	Depth 16' bgs		≱ Fill	er Sand	USCS SIIL		4	
Bottom of Well	Elevation	Depth 16' bgs				USCS Silt		5	
Screen Length	10.0'	Slot Size 10 Slot				USCS Silty Sand		6	
	GROUNDWATER ELEVATION (Measured from the Top of Casir							- 7 - 8	
Elevation 15.75'	DTW 15.81'	Date 8/12/2013				Fill		9	
Elevation	DTW	Date		### ##################################				10	
Elevation	DTW	Date		Sc	reen			E 11	
Elevation	DTW	Date						12	
Elevation	DTW	Date						13	
Top of Casing Top of Seal Top of Filter Top of Screen Bottom of Filter Bottom of Well Screen Length Elevation Elevation Elevation Elevation Elevation Elevation	DTW	Date						15	



Well No. MW-456

		J		VVCII IVO. IVI				
Project	Marcus Hook Industrial C	Complex		Project No. 2574601				
Location	AOI5			Elevation And	d Datum	23	.291	
Drilling Agency	Lewis Environmental		Date Started	5/21/13	Date Finished 5/2	1/13		
Drilling Equipmer	nt Hydrovac Truck			Driller		Paul F	Riale	
Size And Type of	f Bit 10 inch			Inspector		Patrick ⁻	Ггоу	
	ation xcavate to 14.5' bgs. Install 10 foo onite hole plug seal to grade.	t 4" diameter screen a	and 10 foot 4" di	ameter riser. I	Backfill anulus of we	II with filter sand to 2	' bgs.	
Method of Well D Type of Casing PVC Type of Screen	Development			Note 2 foot ris	er, 12.5 foot sand fil	ter, 2 foot bentonite	seal	
Type of Casing PVC	Diameter 4"		Type of Backfill Filter Sar					
	Diameter 4"		Type of Seal Ma Bentonite	terial				
Borehole Diamet	er 18"		Type of Filter Ma					
Slotted Borehole Diamet Top of Casing Top of Seal Top of Filter Top of Screen	Elevation 25.29'	Depth 2' ags	Ŭ∏ W	ell Details	Soil / Rock	Classification	Depth (ft)	
Top of Seal	Elevation 23.29'	Depth 0' bgs		-	USCS Silt			
Top of Filter	Elevation 21.29'	Depth 2' bgs	⋖ -Be	ntonite			1	
Top of Screen	Elevation 18.79'	Depth 4.5' bgs			USCS Silt		2 - 3	
Bottom of Filter	Elevation 8.79'	Depth 14.5' bgs	Tin in the second seco	ter Sand			4	
Bottom of Well	Elevation	Depth 14.5' bgs			USCS SIII		5	
Screen Length	10.0'	Slot Size 10 Slot					6	
	GROUNDWATER ELEVAT (Measured from the Top of Car	sing) ` ´			Fill		7	
Elevation 13.69'	DTW 11.6'	Date 8/12/2013					8	
Elevation	DTW	Date	sc	reen	USCS Sandy Silt		9	
Elevation	DTW	Date					10	
Elevation	DTW	Date					- 11 - - - 12	
Elevation	DTW	Date					13	
Bottom of Filter Bottom of Well Screen Length Elevation 13.69' Elevation Elevation Elevation Elevation	DTW	Date					14	



PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environmental

SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck

JOB NO.: SAMPLING METHOD: Hand auger

LOGGED BY: Yavuz Gungor/ LANGAN SCREEN/RISER DIAMETER: 4"

DATES DRILLED: 5/17/13 WELLBORE DIAMETER: 14"

TOTAL DEPTH: 12.91' ELEVATION:

3.9 Brown fine to coarse Sandy Silt, some clay and fine to coarse angular gravel (moist) 31.1 Olive-grey soft Silt (moist) 5 ample taken at 0 to 1' bgs (lab) Sample taken at 2 to 3' bgs (lab) PVC riser 0 - 2.91' bgs Brown Silt some fine sand trace medium to coarse sand (wet) 27.7 PVC screen from 2.91' - 12.91' bgs



MONITORING WELL LOG: MW-458

PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environmental

SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck

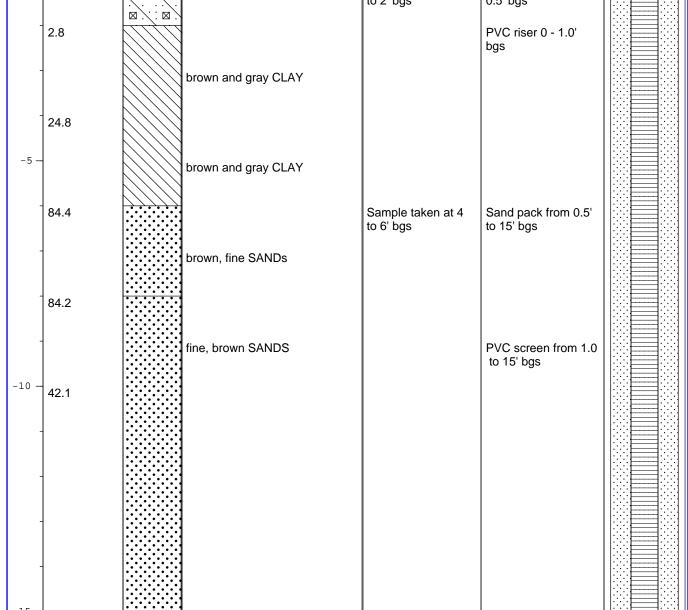
JOB NO.: SAMPLING METHOD: Hand auger

LOGGED BY: Luke Mokrycki SCREEN/RISER DIAMETER: 4"

DATES DRILLED: 5/22/13 WELLBORE DIAMETER: 10"

TOTAL DEPTH: 15' ELEVATION:

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0						
-	2.8		brown CLAY w/ small gravels brown and gray CLAY	Sample taken at 0 to 2' bgs	Bentonite seal 0' - 0.5' bgs PVC riser 0 - 1.0' bgs	





PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environmental

SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck

JOB NO.: SAMPLING METHOD: Hand auger

LOGGED BY: Luke Mokrycki SCREEN/RISER DIAMETER: 4"
DATES DRILLED: 5/21/13 WELLBORE DIAMETER: 10"

TOTAL DEPTH: 15' ELEVATION:

Dark black - dark gray CLAY, oily sheen and strong odor 24.0 Dark black - dark gray CLAY, oily sheen and strong odor Dark brown - gray CLAY Dark brown - gray CLAY Light brown, loose CLAY Dark gray, brown CLAY, moist AAA Black, coarse sand; wet 54.8 PVC Screen 5' to 15' bgs



MONITORING WELL LOG: MW-460

PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environmental & TQD

SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck & HSA

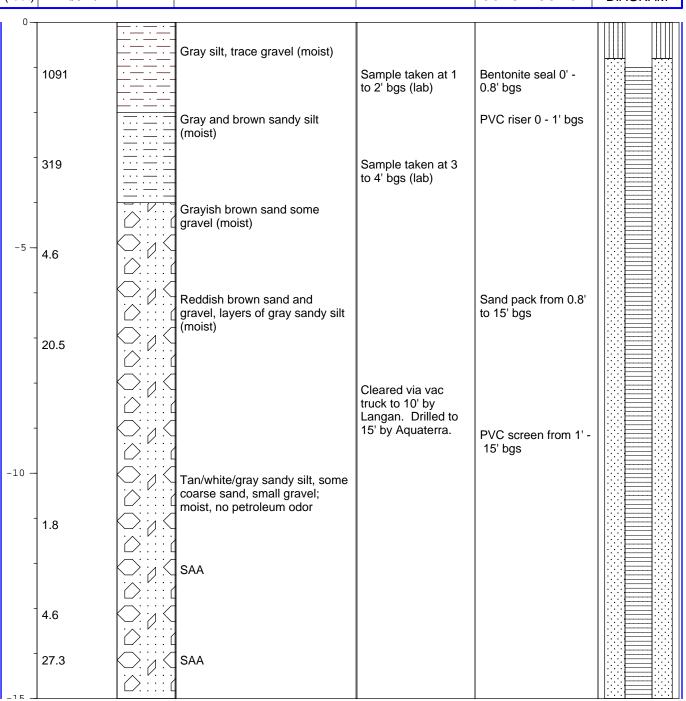
JOB NO.: SAMPLING METHOD: Hand auger & split spoon

LOGGED BY: Eric Dieck/ LANGAN; Noelle Stroik/AT SCREEN/RISER DIAMETER: 4"

DATES DRILLED: 6/7/13 & 6/28/13 WELLBORE DIAMETER: 14"

TOTAL DEPTH: 15 ELEVATION:

Depth OVM (feet) (ppm) USCS LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
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PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environmental

SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck

JOB NO.: SAMPLING METHOD: Hand auger

LOGGED BY: Luke Mokrycki SCREEN/RISER DIAMETER: 4"

DATES DRILLED: 6-11-13 WELLBORE DIAMETER: 14"

Depth (feet) OVM (ppm) USCS LITHOLOGY COMMENTS CONSTRUCTION WELL CONSTRUCTION DIAGRAM O	TOT/		18.5'		SVATION:		
dark brown, silty CLAY and coarse sand Sample taken at 0 to 2' bgs PVC riser 0 - 2.5' bgs PVC riser 0 - 2.5' bgs PVC riser 0 - 2.5' bgs PVC riser 0 - 2.5' bgs PVC riser 0 - 2.5' bgs PVC riser 0 - 2.5' bgs PVC riser 0 - 2.5' bgs PVC riser 0 - 2.5' bgs PVC riser 0 - 2.5' bgs PVC riser 0 - 2.5' bgs PVC riser 0 - 2.5' bgs PVC riser 0 - 2.5' bgs PVC riser 0 - 2.5' bgs PVC riser 0 - 2.5' bgs PVC riser 0 - 2.5' bgs PVC riser 0 - 2.5' bgs PVC riser 0 - 2.5' bgs PVC riser 0 - 2.5' bgs PVC riser 0 - 2.5' bgs PVC screen from 2.5' - 18.5' bgs	Depth	OVM				WELL CONSTRUCTION	WELL DIAGRAM
	(feet)	(ppm) 0.0 823.7 195.3		dark brown, silty CLAY and coarse sand dark green - gray - black, silty SAND fine black SAND dark gray CLAY; moist	Sample taken at 0 to 2' bgs	Bentonite seal 0' - 2.0' bgs PVC riser 0 - 2.5' bgs Sand pack from 2.0' to 18.5' bgs	DIAGRAM



Well No. MW-462

Destruit						Dealer (A)			
Project	Marcus Hook Industrial Complex					Project No. 2574601			
Location		AOI5				Elevation And	Datum		20.611
Drilling Age	g Agency Lewis Environmental						6/11/13	Date Finished	6/11/13
Drilling Equ		Hydrovac Truck				Driller		Р	aul Riale
Size And T		it 10 inch				Inspector		Fr	ick Dieck
Method of I	Installatio		1" diameter screen and	1 10 foot	t 4" diame	terriser Rad	ckfill anulus of well		
		te hole plug seal to grade.	Tulameter Screen and		t + diame	ici iiser. Dav	zami andida di wen	with filter Sand	10 3 bgs.
Method of \							er, 12 foot sand filte	er, 3 foot bento	nite seal
Type of Car PVC	sing	Diameter 4"			f Backfill Ma er Sanc				
Type of Sci Slotte		Diameter 4 "			f Seal Mate ntonite	rial			
Borehole D	iameter	18"			f Filter Mate				
Top of Cas		Elevation 23.61'	Depth 3' ags		Wel	II Details	Soil / Rock	Classification	n Depth (ft)
Top of Sea	I	Elevation 20.61'	Depth 0' bgs				USCS Low Plastici	ity Clay	
Top of Filte	er	Elevation 17.61'	Depth 3' bgs		⋖ -Bent	onite			F 1
Top of Scre	een	Elevation 15.61'	Depth 5' bgs		· ·				- 2 - - - 3
Bottom of F	ilter	Elevation 5.61'	Depth 15' bgs		, ⋖ Filter	⁻ Sand			4
Bottom of V	Vell	Elevation	Depth 15' bgs						<u>-</u> - 5
Screen Ler	ngth	10.0'	Slot Size 10 Slot				USCS Silt		6
		GROUNDWATER ELEVAT (Measured from the Top of Ca	TIONS (ft)		25.05				7
Elevation 16.41'		DTW 7.2'	Date 8/12/2013						- 8 - - - 9
Elevation		DTW	Date		≰ ′ Scre	en	Fill		- 10
Elevation		DTW	Date				Fill		11
Elevation		DTW	Date				· '''		12
Elevation		DTW	Date						13
Top of Cas Top of Sea Top of Filte Top of Scre Bottom of F Bottom of V Screen Ler Elevation 16.41' Elevation Elevation Elevation Elevation		DTW	Date						14



PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environmental

SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck

JOB NO.: SAMPLING METHOD: Hand auger

LOGGED BY: Luke Mokrycki SCREEN/RISER DIAMETER: 4"

DATES DRILLED: 6/12/13-6/13/13 WELLBORE DIAMETER: 10"

TOTAL DEPTH: 9.5' ELEVATION:

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0-		V.7.7.7.7				
-			Light gray Sands (coarse) and Medium brown Clay	Sample taken at 0 to 2' bgs	Bentonite 0' to 1' bgs	
-	0				PVC Riser 0 to 1.5' bgs	
-			Brown and gray Clay	Sample taken at 2 to 4' bgs		
-5 —	89.2				Sand Pack from 1' to 9.5' bgs	
-	3.5		Brown and gray Clay			
-	3. 0		Dark gray, silty sand (fine)			
-	3.8	-/-/-/ -/-/-/-/			PVC Screen 1.5' to 9.5' bgs	
		-7-7-7	Silver, green, orange Clay and Coarse, tan Sands.			

4"



MONITORING WELL LOG: MW-465

PROJECT: DRILLING CO .: **Sunoco- Marcus Hook Refinery** Lewis Environmental & TQD

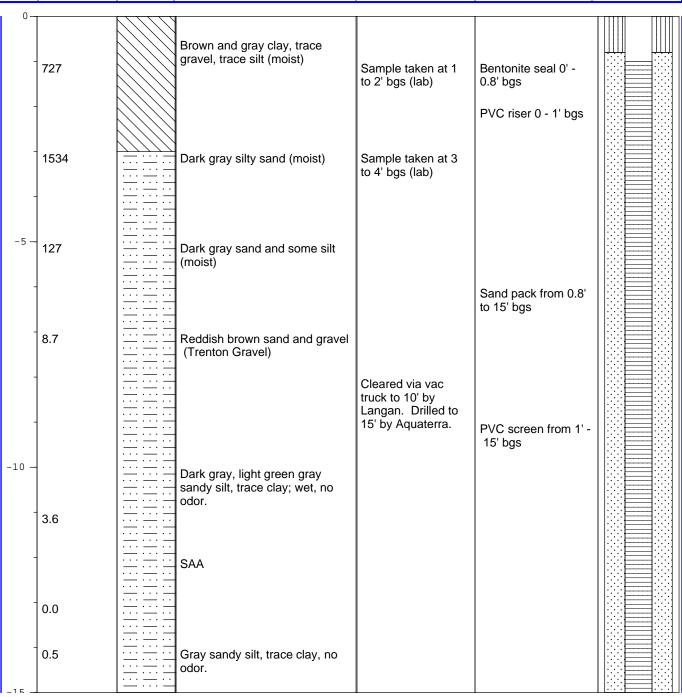
SITE LOCATION: AOI-5 **DRILLING METHOD:** Hydrovac truck & HSA

SAMPLING METHOD: JOB NO .: Hand auger & split spoon

LOGGED BY: SCREEN/RISER DIAMETER: Eric Dieck/ LANGAN; Noelle Stroik/AT DATES DRILLED: 6/11/13 & 6/27/13 WELLBORE DIAMETER: 14"

TOTAL DEPTH: **ELEVATION:** 15

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
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PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environmental & TQD

SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck & HSA

JOB NO.: SAMPLING METHOD: Hand auger & split spoon

LOGGED BY: Eric Dieck/ LANGAN; Noelle Stroik/AT SCREEN/RISER DIAMETER: 4"

DATES DRILLED: 6/12/13 & 7/1/13 WELLBORE DIAMETER: 14"

TOTAL DEPTH: 19 ELEVATION:

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0-						
-	0.3		Fill; brown silt, concrete, brick, rebar, gravel, cobbles, etc. (dry)	Sample taken at 0 to 1' bgs (lab)	Bentonite seal 0.5' - 4' bgs PVC riser 0 - 4.5'	
-	1.0				bgs	***
-5 	85.3		Dark brown silty sand some gravel (dry)			
-	9.0		Dark brown silt trace clay, trace gravel (moist)		Sand pack from 4' to 19' bgs	
-	183.2		Dark gray silty sand (wet)	Sample taken at 9 to 10' bgs (lab)	PVC screen from 4.5' - 19' bgs	
-10 -				to 10 bgs (lab)	4.5 15 595	
-				Hole was collapsing to about 11' during clearing (to 16') by Langan; Aquaterra drilled to finish.		
-15 —						
-	33.1		Gray/white sandy silt, some coarse sand/gravel, moist, slight odor.			
-	20.3	0: ; . C	Gray/white/tan silty sand, little coarse gravel, moist, slight odor.	Auger refusal at 19.5'		



PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environmental

SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck

JOB NO.: SAMPLING METHOD: Hand auger

LOGGED BY: Luke Mokrycki SCREEN/RISER DIAMETER: 4"

DATES DRILLED: 6/7/13 - 6/11/13 WELLBORE DIAMETER: 14"

	S DRILLED:	6/7/13 - 6/11/	V13 WE	LLBORE DIAMETER:	14"	
	AL DEPTH:	12'	ELE	VATION:		
Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
-5	6.0		brown, silty CLAY w/ small gravels light brown - gray CLAY orange - brown CLAY	Sample taken at 0 to 2' bgs	Bentonite seal 0' - 2.0' bgs PVC riser 0 - 2.5' bgs	
-	242.7	^^^^ ^^^^ ^^^ ^^^ ^^ ^^ ^^ ^^ ^^	brown, clay and small gravels	Sample taken at 8 to 10' bgs	Sand pack from 2.0' to 12' bgs PVC screen from 2.5' - 12' bgs	



PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environmental

SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck

JOB NO.: SAMPLING METHOD: Hand auger

JOB NO.: SAMPLING METHOD: Hand auger LOGGED BY: Luke Mokrycki SCREEN/RISER DIAMETER: 4"

DATES DRILLED: 6/7/13 WELLBORE DIAMETER: 10"

TOTAL DEPTH: 13' ELEVATION:

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0-			Brown sandy Clay w/ small gravels	Sample taken at 0 to 2' bgs	Bentonite 0' to 2' bgs	
-	111		Gray and brown Clay		PVC Riser 0 to 3' bgs Sand Pack from 2' to	
-5 -	117		Dark gray Clay	Sample taken at 4 to 6' bgs	13' bgs	
-	35.4		Light gray Clay		PVC Screen 3' to 13' bgs	
-10 -	47.1		Gray Clay and small gravels			
-						



PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environmental

SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck

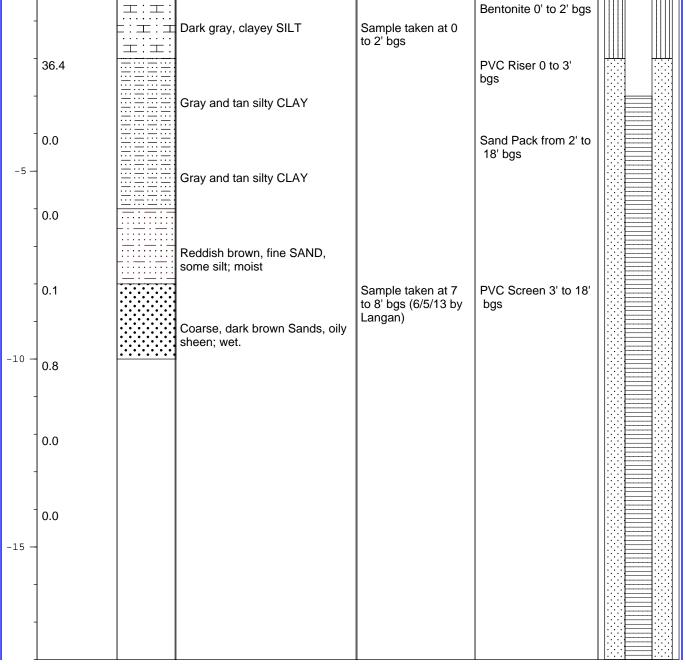
JOB NO.: SAMPLING METHOD: Hand auger LOGGED BY: Eric Dreck (boring); Noelle Stroik (well) SCREEN/RISER DIAMETER: 4"

LOGGED BY: Eric Dreck (boring); Noelle Stroik (well) SCREEN/RISER DIAMETER: 4"

DATES DRILLED: 6/4/13; 6/5/13; 7/1/13 WELLBORE DIAMETER: 10"

TOTAL DEPTH: 18' ELEVATION:

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0			Dark gray, clayey SILT	Sample taken at 0	Bentonite 0' to 2' bgs	





Well No MW-472

	/ U C U / U / U		v	veii No. ivi	**- - 712		
Project	Marcus Hook Industrial C	omplex		Project No.		2	2574601
Location	AOI5			Elevation And	l Datum		21.792
Drilling Agency	Lewis Environmental			Date Started	6/5/13	Date Finished	6/5/13
Drilling Equipmen	t Hydrovac Truck			Driller		Pa	ul Riale
Size And Type of	•			Inspector			ick Troy
Method of Installa		t 4" diameter careen s	and 5 foot 4" diam	eter riser. Pr	ackfill anulus of wal		
Install bento	nite hole plug seal to grade.			Note total dep	th of 13 feet bgs, 8	foot screen, 8 fo	oot riser, well
Type of Casing PVC Type of Screen	Nanata		Trus of Doolesii M	sand up	to 3 feet bgs, bento	nite seal from 0.	5 to 3 feet
Type of Casing PVC	Diameter 4"		Type of Backfill M Filter San	d			
Type of Screen Slotted	Diameter 4"		Type of Seal Mate Bentonite	erial			
Borehole Diamete	er 18"		Type of Filter Mat Filter San				
Top of Casing	Elevation 25.10'	Depth 3.31' ags	We	ell Details	Soil / Rock	Classification	Depth (ft)
Top of Seal	Elevation 21.79'	Depth 0' bgs			GRAVEL trace silt	(dry)	
Top of Seal Top of Filter Top of Screen	Elevation 18.79'	Depth 3' bgs	— ⊸ Ben	tonite	Dark brown SILT to	race gravel (dry)	1
Top of Screen	Elevation 16.79'	Depth 5' bgs					_ 2
Bottom of Filter	Elevation 8.79'	Depth 13' bgs			Brown, orange, gre	ey CLAY (dry)	_ 3 _
Bottom of Well	Elevation	Depth 13' bgs	Filte	r Sand			<u> </u>
Screen Length	8.0'	Slot Size 10 Slot			Dark gray silty CLA	AY (moist)	5
	GROUNDWATER ELEVAT	IONS (ft)					6
Elevation 15.49'	DTW 9.61'	Date 8/12/2013					<u> </u>
Elevation	DTW	Date					E 8
Elevation	DTW	Date	Scre	een	Orange, brown cou GRAVEL (Trenton		<u> </u>
Elevation	DTW	Date				· · · ,	- - 10
Elevation	DTW	Date					E 11
Bottom of Filter Bottom of Well Screen Length Elevation 15.49' Elevation Elevation Elevation Elevation	DTW	Date					12



PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environmental

SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck

JOB NO.: SAMPLING METHOD: Hand auger LOGGED BY: Luke Mokrycki SCREEN/RISER DIAMETER: 4"

LOGGED BY: Luke Mokrycki SCREEN/RISER DIAMETER: 4"

DATES DRILLED: 6/4/13 WELLBORE DIAMETER: 14"

	ES DRILLED:	6/4/13		LBORE DIAMETER:	14"	
TOT	AL DEPTH:	17'	ELE	VATION:		
Deptl (feet)		USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0-		Ι Δ			'	
	0.0	^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^	light brown to orange, clayey SILT w/ small gravels	Sample taken at 0 to 2' bgs	Bentonite seal 0' - 2.0' bgs PVC riser 0 - 2.5' bgs	
-5 -	295	^^^ ^^^ ^^^	gray and brown CLAY grayish green and brown CLAY			
	216	^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^ ^	brown, sandy SILT	Sample taken at 2 to 4' bgs	Sand pack from 2.0' to 17' bgs	
-10 -	88.9	^^^^ ^^^^	dark gray, clayey SILT		PVC screen from 2.5' - 17' bgs	
-15 -						



MONITORING WELL LOG: MW-476

PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environmental

SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck

JOB NO.: SAMPLING METHOD: Hand auger

LOGGED BY: Eric Dreck; Noelle Stroik SCREEN/RISER DIAMETER: 4"

DATES DRILLED: 6/3/13 - 7/2/13 WELLBORE DIAMETER: 10"

TOTAL DEPTH: 15' ELEVATION:

101	AL DEI III.	13		V/(11014.	,	
Depth (feet)		USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0-		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	NA	Sample taken at 0 to 2' bgs	Bentonite 0' to 0.8' bgs	
-	0.1		Brown silty CLAY, trace fine to		PVC Riser 0 to 1' bgs	
-	0.1		coarse sand (moist)		Sand Pack from 0.8' to 15' bgs	
-5 -			Brown SILT, trace gravel (moist)	Completelier of C		
-	1.2		Brown SAND, trace silt (moist)	Sample taken at 6 to 7' bgs		
-	PID not available		Brown SAND, trace silt (moist)		PVC Screen 1' to 15' bgs	
-10 —	PID not available		BIOWIT SAIND, TRACE SITE (HIOIST)			
-			Brown/gray, sandy SILT, little small gravel, and little clay (wet) *no petro-like odor			
-	0.8		Brown/gray, sandy SILT, little small gravel, and little clay (wet)			
-15	0.1		*no petro-like odor			



MONITORING WELL LOG: MW-478

PROJECT:

Sunoco- Marcus Hook Refinery

DRILLING CO .:

Lewis Environmental

SITE LOCATION: AOI-5

01-5

DRILLING METHOD:

Hydrovac truck

JOB NO.:

SAMPLING METHOD:

. .

LOGGED BY:

Evan Ellewanger

SCREEN/RISER DIAMETER:

Hand auger

DATES DRILLED: 5/31/13

.....

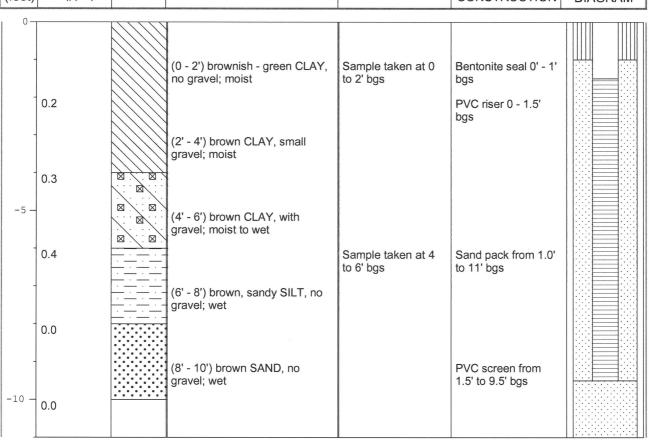
WELLBORE DIAMETER:

4" 10"

TOTAL DEPTH: 9.5'

ELEVATION:

Dept	1 7	USCS	LITHOLOGY	COMMENTS	WELL	WELL
(feet)	(ppm)	0000	LITHOLOGY	COMMENTS	CONSTRUCTION	DIAGRAM





PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environmental

SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck

JOB NO.: SAMPLING METHOD: Hand auger

LOGGED BY: Evan Ellewanger SCREEN/RISER DIAMETER: 4"

DATES DRILLED: 5/31/13 WELLBORE DIAMETER: 14"

	DEPTH:	5/31/13		LBORE DIAMETER: VATION:	14"	
Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0 —						
-		\(\lambda \) \(brownish green CLAY w/ gravel; dry	Sample taken at 0 to 2' bgs	Bentonite seal 0' - 2' bgs	
0.		\(\lambda \) \(brownish gray CLAY w/ gravel; dry		PVC riser 0 - 4' bgs	
-5 -			brown SAND w/ no gravel; wet			
0.	.0	^ ^ ^ ^	brownish gray SAND; wet	Sample taken at 6 to 8' bgs	Sand pack from 2.0' to 12' bgs	
0.	.0	\(\lambda \) \(brownish green SAND; wet		PVC screen from 4' to 12' bgs	
-10 - 0.	0					



PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environmental

SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck

JOB NO.: SAMPLING METHOD: Hand auger

LOGGED BY: Luke Mokrycki SCREEN/RISER DIAMETER: 4"

DATES DRILLED: 6-14-13 WELLBORE DIAMETER: 14"

ТОТ	AL DEPTH:	15.5'	ELE	VATION:		
Depth (feet)		uscs	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
-	135.7	^^^^ ^^^^ ^^^^	dark brown, sandy SILTS and gravels	Sample taken at 0 to 2' bgs	Bentonite seal 0' - 2.0' bgs PVC riser 0 - 2.5' bgs	
-	1730	^ ^ ^ ^	shiny, black CLAY	*strong odor		
-5 	1008	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	shiny, black and gray CLAY	*strong odor Sample taken at 2 to 4' bgs	Sand pack from 2.0' to 15.5' bgs	
-	56.8	^^^ ^^^ ^^^	dark tan and gray CLAY; moist	J	J	
-10 —	26.9	^^^^ ^^^^	dark gray and tan CLAY; wet		PVC screen from 2.5' - 15.5' bgs	
-						
-15 —						



PROJECT: Sunoco- Marcus Hook Refinery DRILLING CO.: Lewis Environmental

SITE LOCATION: AOI-5 DRILLING METHOD: Hydrovac truck

JOB NO.: SAMPLING METHOD: Hand auger LOGGED BY: Eric Dreck; Luke Mokrycki SCREEN/RISER DIAMETER: 4"

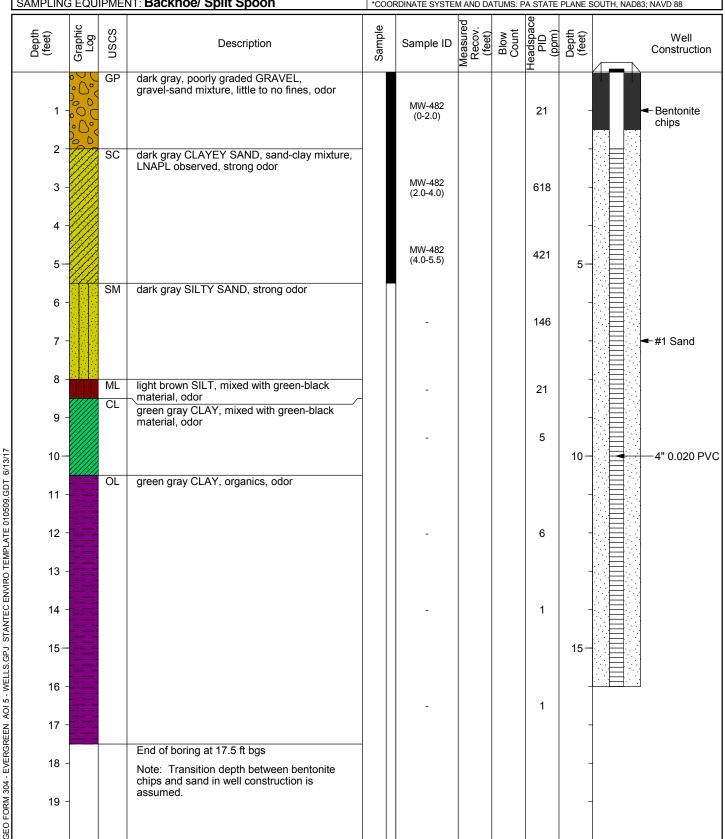
LOGGED BY: Eric Dreck; Luke Mokrycki SCREEN/RISER DIAMETER: 4"

DATES DRILLED: 6/13/13 WELLBORE DIAMETER: 10"

TOTAL DEPTH: 13' ELEVATION:

Depth (feet)	OVM (ppm)	USCS	LITHOLOGY	COMMENTS	WELL CONSTRUCTION	WELL DIAGRAM
0-		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	NA	Sample taken at 0 to 1' bgs	Bentonite 0' to 0.8' bgs	
	3.3		Brown silty CLAY, trace fine to coarse sand (moist)		PVC Riser 0 to 1' bgs	
-5 -	3.3		Brown SILT, trace gravel	Sample taken at 5	Sand Pack from 0.8' to 15' bgs	
-	2.6		(moist) Brown SAND, trace silt (moist)	to 6' bgs		
-	0.3		Brown SAND, trace silt (moist)		PVC Screen 1' to 15' bgs	
-10 -	0.5		Brown/gray, sandy SILT, little small gravel, and little clay (wet) *no petro-like odor			

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec** LOCATION: AOI 5 MW-482 PAGE 1 OF 1 PROJECT NUMBER: 213402567 *NORTHING (ft): 183030.286 *EASTING (ft): 2620854.418 DRILLING: STARTED **9/19/13** COMPLETED: 9/20/13 *GROUND ELEV (ft): NA *TOC ELEV (ft): 12.3 COMPLETED: INSTALLATION: STARTED INITIAL DTW (ft): Not Measured BOREHOLE DEPTH (ft): 17.5 DRILLING COMPANY: Total Quality Drilling STATIC DTW (ft): Not Measured WELL DEPTH (ft): 16 DRILLING EQUIPMENT: BackHoe/Holemaster WELL CASING DIAMETER (in): 4 BOREHOLE DIAMETER (in): 10 DRILLING METHOD: Backhoe/Split Spoon/HSA LOGGED BY: J. Richter CHECKED BY: A. Patel SAMPLING EQUIPMENT: Backhoe/ Split Spoon *COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88



BORING LOGS

LOCATION:

Sunoco Marcus Hook Refinery, Post Road

DATE:

14 and 15 January, 2000

GEOLOGIST:

James Mulry, P.G.

DRILLER:

B. L. Myers Bros., Inc., Glenmoore, PA

METHOD:

Earthprobe®, 2" Core barrel

CONSTRUCTION:

5' X 1.5" Schedule 40 PVC Screen (0.020" Slot), 5' X 1.5"

Sch 40 PVC Pipe;

	BORING B-53,	TOTAL DEPTH 8'
DEPTH	DESCRIPTION	COMMENTS
0-1'	Asphalt and ballast	O I I I I I I I I I I I I I I I I I I I
1'-3'	Slightly very fine sandy brown clay	Gradational change to lower unit
3'-5'	Slightly very fine sandy gray clay	Increasing sand and coarsening downward, grading into lower unit
5'-8'	Fine to medium gray sand	and into lower unit

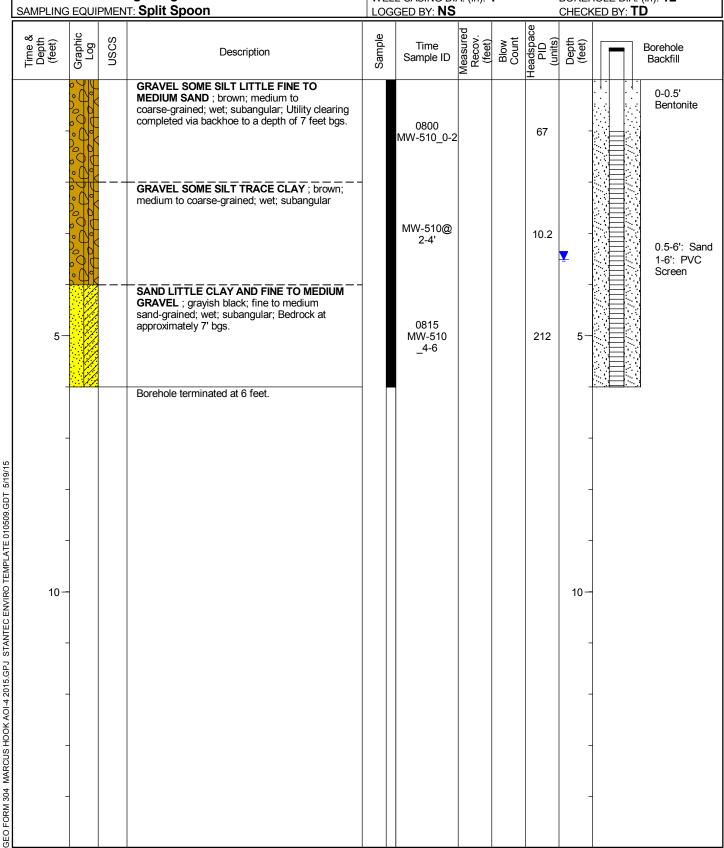
MV-B53

	BORING B-54,	TOTAL DEPTH 8'
DEPTH	DESCRIPTION	COMMENTS
0-1'	Asphalt and ballast	O MINICITY S
1'-6'	Slightly very fine sandy brown clay	Gradational change to lower unit
6'-8'	Slightly very fine sandy gray clay	Increasing sand and coarsening downward, grading into lower unit
8'	Fine to very fine gray sand	and an arrang into lower drift

	BORING B-5	5, TOTAL DEPTH 8'	
DEPTH	DESCRIPTION	COMMENTS	
0-1'	Gravel over geo-fabric	OCIMINETY'S	
1'-3'	Slightly fine sandy clay	Some gravel, fill?	
3'-6'	No Return	No return due to void?	
6'-8'	Dark gray/black clay	THE TOTAL TITLE TO VOICE	

A01-5 MW-01855

PROJECT: Marcus Hook Refinery WELL / PROBEHOLE / BOREHOLE NO: **LOCATION: AOI-5** MW-510 PAGE 1 OF 1 PROJECT NUMBER: NORTHING (ft): EASTING (ft): DRILLING / INSTALLATION: LAT: LONG: **3/18/15** COMPLETED: 3/24/15 STARTED GROUND ELEV (ft): TOC ELEV (ft): DRILLING COMPANY: Total Quality Drilling INITIAL DTW (ft): Not Encountered WELL DEPTH (ft): 6.0 DRILLING EQUIPMENT: **HSA** STATIC DTW (ft): 3.51 BOREHOLE DEPTH (ft): **6.0** DRILLING METHOD: Auger Rig BOREHOLE DIA. (in): 12 WELL CASING DIA. (in): 4



PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI-5** MW-554 PAGE 1 OF 2 PROJECT NUMBER: 213402567.200 *NORTHING (ft): 181622.85 *EASTING (ft): 2622344.89 DRILLING: STARTED **8/31/15** COMPLETED: **9/2/15** *GROUND ELEV (ft): 17.8 *TOC ELEV (ft): 19.9 INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 8 BOREHOLE DEPTH (ft): 22 DRILLING COMPANY: HT Sweeney/Parratt Wolff STATIC DTW (ft): 8.5 WELL DEPTH (ft): DRILLING EQUIPMENT: Track Mounted IR A-300/Backhoe WELL CASING DIAMETER (in): 4 BOREHOLE DIAMETER (in): 10 DRILLING METHOD: Direct Push Macrocore, Split Spoon/HSA LOGGED BY: DH/AK CHECKED BY: J. DeBoer SAMPLING EQUIPMENT: Backhoe/Direct Push Macrocore/SS *COORDINATE SYSTEM AND DATUMS: NJ STATE PLANE SOUTH, NAD83; NAVD 88 Sample Graphic Log USCS Blow Count Depth (feet) Depth (feet) Well Description Sample ID Construction FILL; brown, fine to medium, silty sand with some gravel, dry MW-554 (0-2')0.0 Bentonite 20150831 chips 2 4" PVC Riser 2 FILL; Brown, silty CLAY with little fine to FILL medium sand, dry 9 5 5 5-6 MW-554 25 #1 Sand 7 (6-8')20150831 Location cleared to 8' via backhoe. Switched 9 to hollow stem auger with direct push split 0.0 8 spoon. FILL FILL; Brown/black, CLAY/SILT, trace fine sand, slight micaceous quartzite gravel in tip, moist to wet 9 0.2 Probe refusal at 10'. Switch to direct push split spoons. 4" 0.020 PVC 10 3 10 FILL FILL; Same as above, concrete/rock FILL FILL; Dark grayish brown, gray/black, CLAY/SILT, wet, saturated by 12' +/-8.0 11 STANTEC ENVIRO TEMPLATE 010509.GDT 12 0.0 FILL FILL; Same as above, concrete debris, some gneiss fragments 13 0.5 Refusal at 13.5' on old stone wall. Offset ~4-5' south and continued spooning at 14' 5 14 CL below ground surface CL; Dark gray CLAY, possible fill, little fine to coarse gravel, trace rootlets or other fibers, 15 8.0 15 55 AOI 5 - SEPTEMBER 2015, GPJ

0.0

1.3

0

16

17

18

19

CL

SP

CL; Same as above

VOID VOID; No Recovery

SP: Orange-brown to brown, fine to medium SAND, well sorted, some black grains, wet

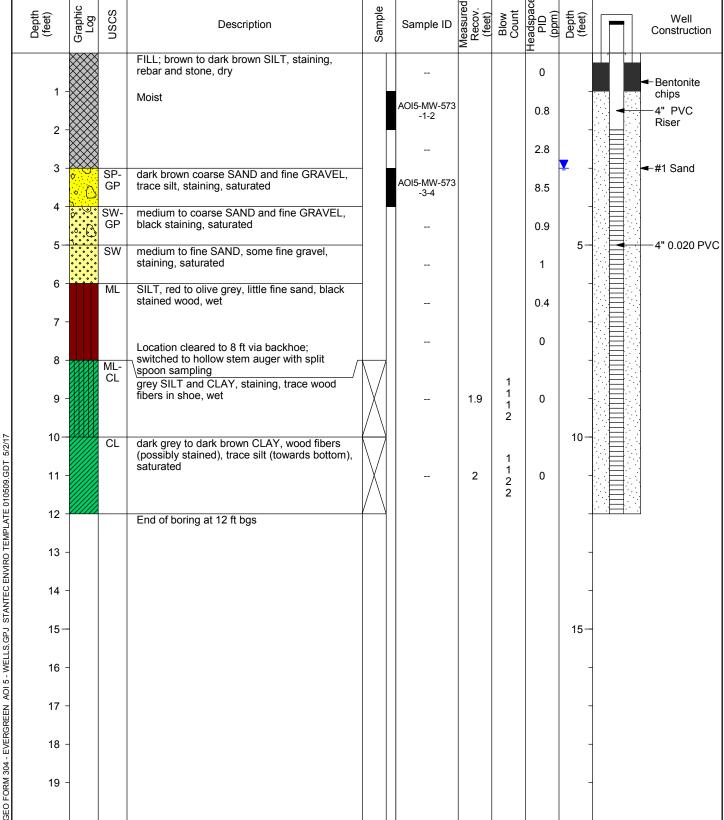
PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec** LOCATION: **AOI-5** PROJECT NUMBER: 213402567.200 MW-554 PAGE 2 OF 2 *NORTHING (ft): 181622.85 *EASTING (ft): 2622344.89 **COMPLETED: 9/2/15** DRILLING: STARTED **8/31/15** *GROUND ELEV (ft): **17.8** *TOC ELEV (ft): 19.9 COMPLETED: INSTALLATION: STARTED INITIAL DTW (ft): 8 BOREHOLE DEPTH (ft): 22 DRILLING COMPANY: HT Sweeney/Parratt Wolff STATIC DTW (ft): 8.5 WELL DEPTH (ft): DRILLING EQUIPMENT: Track Mounted IR A-300/Backhoe WELL CASING DIAMETER (in): 4 BOREHOLE DIAMETER (in): 10 DRILLING METHOD: Direct Push Macrocore, Split Spoon/HSA LOGGED BY: DH/AK CHECKED BY: J. DeBoer SAMPLING EQUIPMENT: Backhoe/Direct Push Macrocore/SS *COORDINATE SYSTEM AND DATUMS: NJ STATE PLANE SOUTH, NAD83; NAVD 88 Sample Graphic Log **USCS** Blow Count Depth (feet) Well Description Sample ID Construction SP SP; Dark brown, fine SAND, trace medium sand, wet 0.0 21 1 CL CL; Dark brown CLAY, trace to little fine sand, trace coarse sand 22 End of boring at 22' 23 24 25 25 26 27 28 29 30 30 31 GEO FORM 304 AOI 5 - SEPTEMBER 2015.GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 32 33 34 35 35 36 37 38

39

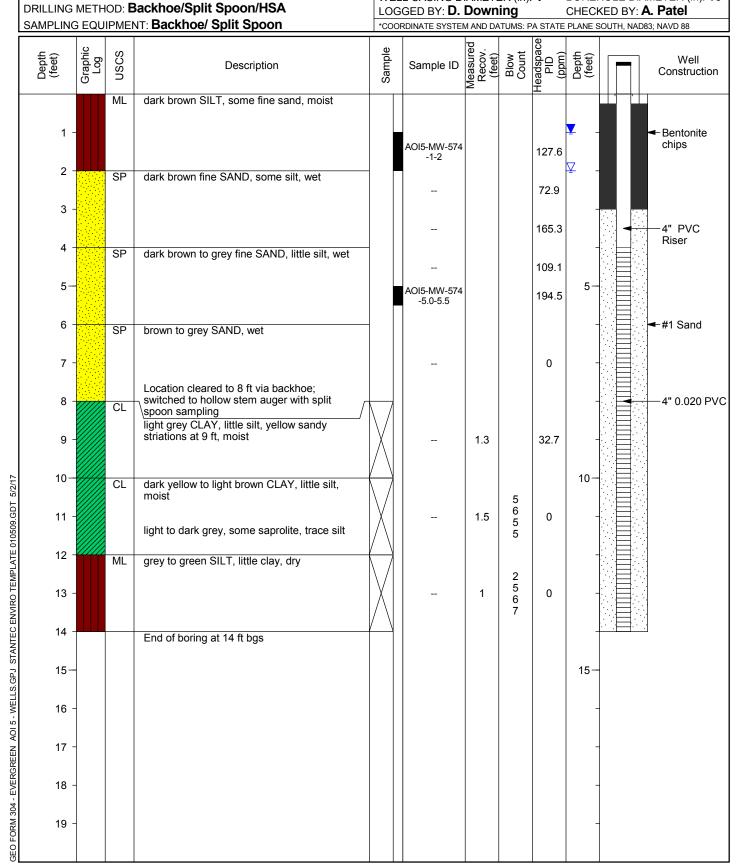
PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec LOCATION: AOI-5** PAGE 1 OF 1 MW-555 PROJECT NUMBER: 213402567.200 *NORTHING (ft): 183480.23 *EASTING (ft): 2622318.09 DRILLING: STARTED **8/31/15** COMPLETED: 8/31/15 *GROUND ELEV (ft): 11.3 *TOC ELEV (ft): 10.94 INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 8 BOREHOLE DEPTH (ft): 11.5 DRILLING COMPANY: HT Sweeney/Parratt Wolff STATIC DTW (ft): 2 WELL DEPTH (ft): DRILLING EQUIPMENT: Track Mounted IR A-300/Backhoe WELL CASING DIAMETER (in): 4 BOREHOLE DIAMETER (in): 10 DRILLING METHOD: Direct Push Macrocore, Split Spoon/HSA LOGGED BY: DH/JD CHECKED BY: A. Klingbeil SAMPLING EQUIPMENT: Backhoe/Direct Push Macrocore/SS *COORDINATE SYSTEM AND DATUMS: NJ STATE PLANE SOUTH, NAD83; NAVD 88 Headspace PID (ppm) Sample Graphic Log uscs Blow Count Depth (feet) Depth (feet) Well Description Sample ID Construction **ASPHALT** SM; Dark brown, fine to medium, silty SAND, SM Bentonite some gravel, dry 1 0.0 chips MW-555 (0.5-2')4" PVC 20150831 2 29 Riser SM SM; Same as above, SAND, trace to no gravel, dry 3 #1 Sand CL; Dark brown, silty CLAY, little fine sand, CL dry to moist 4 37 5 31 5 4" 0.020 PVC 6 MW-555 (6-8')_ 20150831 7 Moist at 7.0' Location cleared to 8' via backhoe. Switched to hollow stem auger with direct push split ∇ 50 8 spoon. SW-SW-SM; Grayish-brown, fine SAND, some SM gravel, little silt, trace clay. Gravel is well 9 rounded, poorly sorted, wet 7 Reddish brown cobble at 9.5' Same as 8-9' but yellowish-brown 3.5 10 0.0 10 0.0 11 BR BR; Weathered BEDROCK, whitish-gray, GEO FORM 304 AOI 5 - SEPTEMBER 2015. GPJ STANTEC ENVIRO TEMPLATE 010509. GDT rock fragments $\overline{\mathsf{BR}}$ BR; BEDROCK, orange black and white 12 SAND, some clay, micaceous, moist Refusal at 11.5 13 14 15 15 16 17 18 19

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec** LOCATION: AOI 5 PAGE 1 OF 1 PROJECT NUMBER: 213402567 *NORTHING (ft): 182743.6 *EASTING (ft): 2622205.36 DRILLING: STARTED 6/24/16 COMPLETED: 6/27/16 *GROUND ELEV (ft): 5.66 *TOC ELEV (ft): **8.32** INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 3 BOREHOLE DEPTH (ft): 12 DRILLING COMPANY: HT Sweeney / Total Quality Drilling STATIC DTW (ft): 3 WELL DEPTH (ft): 12 DRILLING EQUIPMENT: BackHoe/Holemaster

WELL CASING DIAMETER (in): 4 BOREHOLE DIAMETER (in): 10 DRILLING METHOD: Backhoe/Split Spoon/HSA LOGGED BY: D. Downing CHECKED BY: A. Patel SAMPLING EQUIPMENT: Backhoe/ Split Spoon *COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88 Headspace PID (ppm) Sample Graphic Log Blow Count Depth (feet) Depth (feet) Well Description Sample ID Construction FILL; brown to dark brown SILT, staining, rebar and stone, dry 0 Bentonite



PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec** LOCATION: AOI 5 PAGE 1 OF 1 PROJECT NUMBER: 213402567 *NORTHING (ft): 184209.5 *EASTING (ft): 2622872.16 DRILLING: STARTED 6/15/16 COMPLETED: 6/20/16 *GROUND ELEV (ft): 12.46 *TOC ELEV (ft): 15.03 INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 2 BOREHOLE DEPTH (ft): **14** DRILLING COMPANY: HT Sweeney / Total Quality Drilling STATIC DTW (ft): 1 WELL DEPTH (ft): 14 DRILLING EQUIPMENT: BackHoe/Holemaster WELL CASING DIAMETER (in): 4 BOREHOLE DIAMETER (in): 10



PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec** LOCATION: AOI 5 PAGE 1 OF 1 PROJECT NUMBER: 213402567 *NORTHING (ft): 183002.16 *EASTING (ft): 2621657.34 DRILLING: STARTED 6/17/16 COMPLETED: 6/27/16 *GROUND ELEV (ft): 11.16 *TOC ELEV (ft): 13.69 INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 10 BOREHOLE DEPTH (ft): 16 DRILLING COMPANY: HT Sweeney / Total Quality Drilling STATIC DTW (ft): 5 WELL DEPTH (ft): 15 DRILLING EQUIPMENT: BackHoe/Holemaster WELL CASING DIAMETER (in): 4 BOREHOLE DIAMETER (in): 10 DRILLING METHOD: Backhoe/Split Spoon/HSA

LOGGED BY: D. Downing

CHECKED BY: A. Patel

SAMPLING EQUIPMENT: Backhoe/ Split Spoon *COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88 Sample Graphic Log USCS Blow Count PID (ppm) Depth (feet) Depth (feet) Well Description Sample ID Construction GC brown, sandy gravelly CLAY, pebbles and cobbles, dry AOI5-MW-575 1 Bentonite 1 -0-2 chips 2 slight odor starting at 2 ft 3 19 4 increasing clay content below 4 ft, stiff 2 4" PVC Riser 5-5 CL brown CLAY, some pebbles, black staining, odor, dry 295 6 AOI5-MW-575 595 7 -6.5-7.5 Location cleared to 8 ft via backhoe; 212 switched to hollow stem auger with split #1 Sand 8 spoon sampling No Recovery 9 0 5 5 <u>V</u> 10− 4" 0.020 PVC 10 brown to grey SILT and CLAY, wet ML 5 brown, medium to fine SAND, broken rocks, GEO FORM 304 - EVERGREEN AOI 5 - WELLS. GPJ STANTEC ENVIRO TEMPLATE 010509.GDT SW 9 saturated 1.7 7.5 11 SP 16 brown fine SAND, little silt and clay, 20 saturated 12 SW brown to dark brown, medium to fine SAND, saturated 5 9 13 0.4 0 14 7 14 brown to red, medium to fine SAND, trace silt SW and clay, saturated 3 4 15 0.3 0 15 3 16 End of boring at 16 ft bgs 17 18 19

PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec** LOCATION: AOI 5 MW-576 PAGE 1 OF 1 PROJECT NUMBER: 213402567 *NORTHING (ft): 182570.44 *EASTING (ft): 2621565.1 DRILLING: STARTED 6/16/16 COMPLETED: 6/27/16 *GROUND ELEV (ft): 6.99 *TOC ELEV (ft): 9.62 INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 4 BOREHOLE DEPTH (ft): **14** DRILLING COMPANY: HT Sweeney / Total Quality Drilling STATIC DTW (ft): 2.5 WELL DEPTH (ft): 13 DRILLING EQUIPMENT: BackHoe/Holemaster WELL CASING DIAMETER (in): 4 BOREHOLE DIAMETER (in): 10

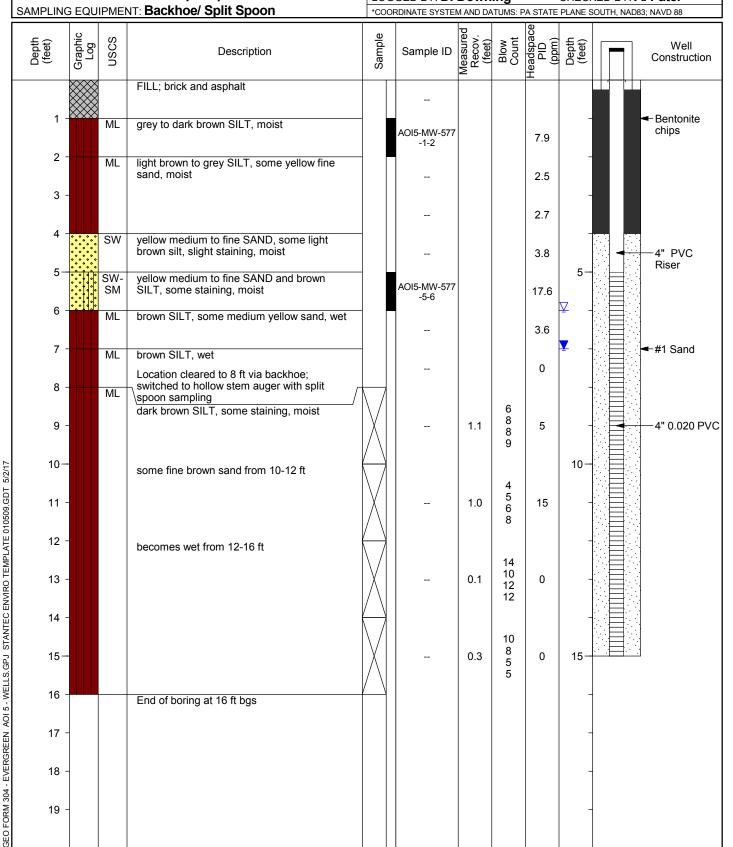
LOGGED BY: **D. Downing**

CHECKED BY: A. Patel

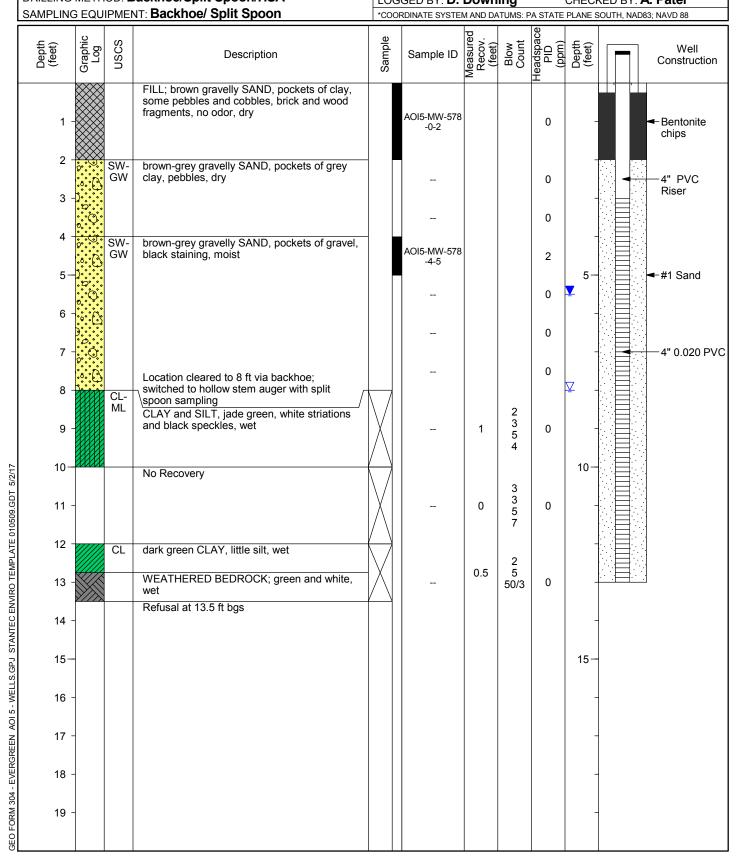
DRILLING METHOD: Backhoe/Split Spoon/HSA

SAMPLING EQUIPMENT: Backhoe/ Split Spoon *COORDINATE SYSTEM AND DATUMS: PA STATE PLANE SOUTH, NAD83; NAVD 88 Headspace PID (ppm) Sample Graphic Log **USCS** Blow Count Depth (feet) Depth (feet) Well Description Sample ID Construction ML brown SILT, some file sand, little gravel, dry AOI5-MW-576 1 0 Bentonite -0-2 chips 2 ML brown to grey SILT, little fine sand, moist 0 4" PVC Riser 3 ML brown to grey SILT, moist 0 ∇ grey SILT, little clay, some black staining, ML AOI5-MW-576 4.7 -4-5 5-5 #1 Sand CL grey CLAY, some silt, black staining, wet 2.1 6 1.1 4" 0.020 PVC 7 grey to dark grey to grey CLAY, black staining, little silt and organic material, wet 0.1 Location cleared to 8 ft via backhoe; 8 switched to hollow stem auger with split spoon sampling 2 2 2 2 1.2 n 9 10 10 GEO FORM 304 - EVERGREEN AOI 5 - WELLS. GPJ STANTEC ENVIRO TEMPLATE 010509.GDT 2 2 0 11 1.7 2 12 CL grey CLAY, wet, stiff at bottom 0.1 ft 13 0.5 0 2 14 End of boring at 14 ft bgs 15 15 16 17 18 19

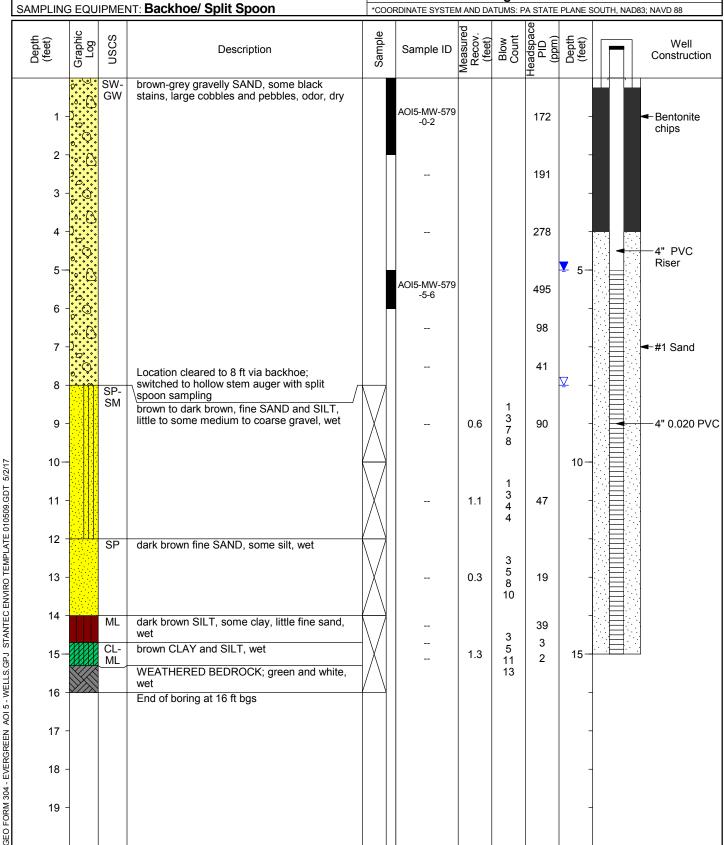
PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec** LOCATION: AOI 5 PAGE 1 OF 1 PROJECT NUMBER: 213402567 *NORTHING (ft): 181932.78 *EASTING (ft): 2621553.37 DRILLING: STARTED 6/16/16 COMPLETED: 6/22/16 *GROUND ELEV (ft): 12.13 *TOC ELEV (ft): 14.65 INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 6 BOREHOLE DEPTH (ft): 16 DRILLING COMPANY: HT Sweeney / Total Quality Drilling STATIC DTW (ft): 7 WELL DEPTH (ft): 15 DRILLING EQUIPMENT: BackHoe/Holemaster WELL CASING DIAMETER (in): 4 BOREHOLE DIAMETER (in): 10 DRILLING METHOD: Backhoe/Split Spoon/HSA LOGGED BY: **D. Downing** CHECKED BY: A. Patel



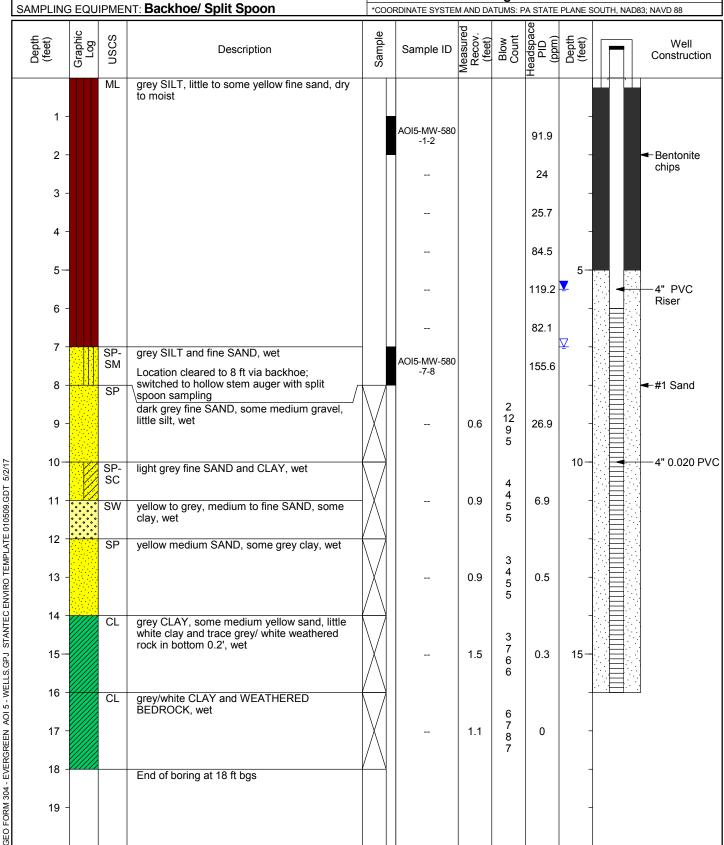
PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec** LOCATION: AOI 5 MW-578 PAGE 1 OF 1 PROJECT NUMBER: 213402567 *NORTHING (ft): 182536.97 *EASTING (ft): **2620162.44** DRILLING: STARTED 6/17/16 COMPLETED: 6/23/16 *GROUND ELEV (ft): 13.15 *TOC ELEV (ft): 15.74 INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 8 BOREHOLE DEPTH (ft): 13.5 DRILLING COMPANY: HT Sweeney / Total Quality Drilling STATIC DTW (ft): 5.5 WELL DEPTH (ft): 13 DRILLING EQUIPMENT: BackHoe/Holemaster WELL CASING DIAMETER (in): 4 BOREHOLE DIAMETER (in): 10 DRILLING METHOD: Backhoe/Split Spoon/HSA LOGGED BY: D. Downing CHECKED BY: A. Patel



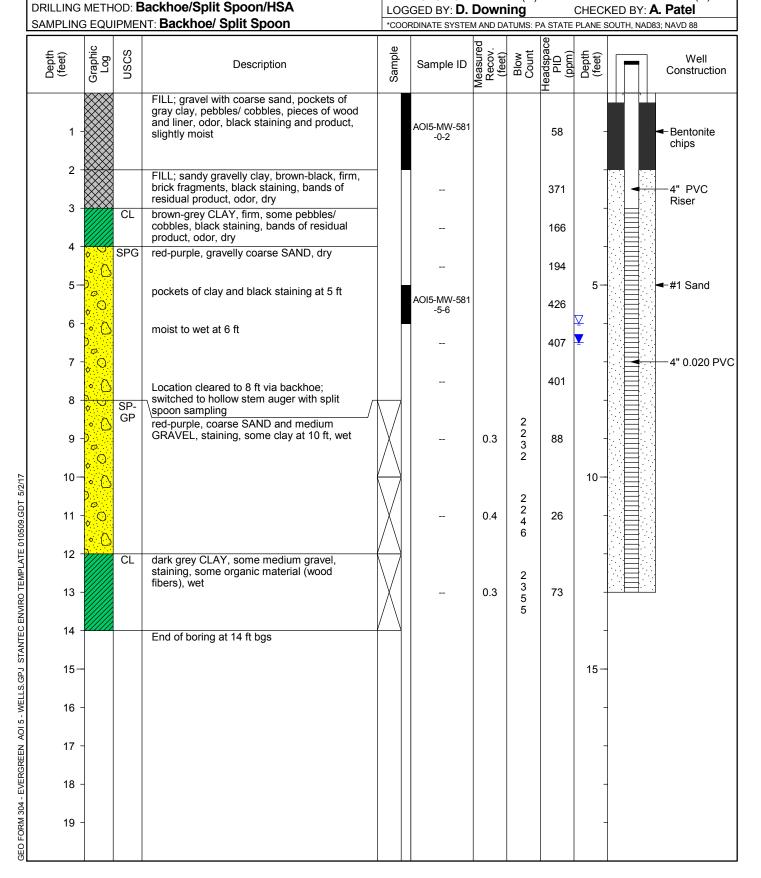
PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec** LOCATION: AOI 5 MW-579 PAGE 1 OF 1 PROJECT NUMBER: 213402567 *NORTHING (ft): **182706.72** *EASTING (ft): 2620430.73 DRILLING: STARTED 6/17/16 COMPLETED: 6/24/16 *GROUND ELEV (ft): 13.71 *TOC ELEV (ft): 16.56 INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 8 BOREHOLE DEPTH (ft): 16 DRILLING COMPANY: HT Sweeney / Total Quality Drilling STATIC DTW (ft): 5 WELL DEPTH (ft): 15 DRILLING EQUIPMENT: BackHoe/Holemaster WELL CASING DIAMETER (in): 4 BOREHOLE DIAMETER (in): 10 DRILLING METHOD: Backhoe/Split Spoon/HSA LOGGED BY: D. Downing CHECKED BY: A. Patel



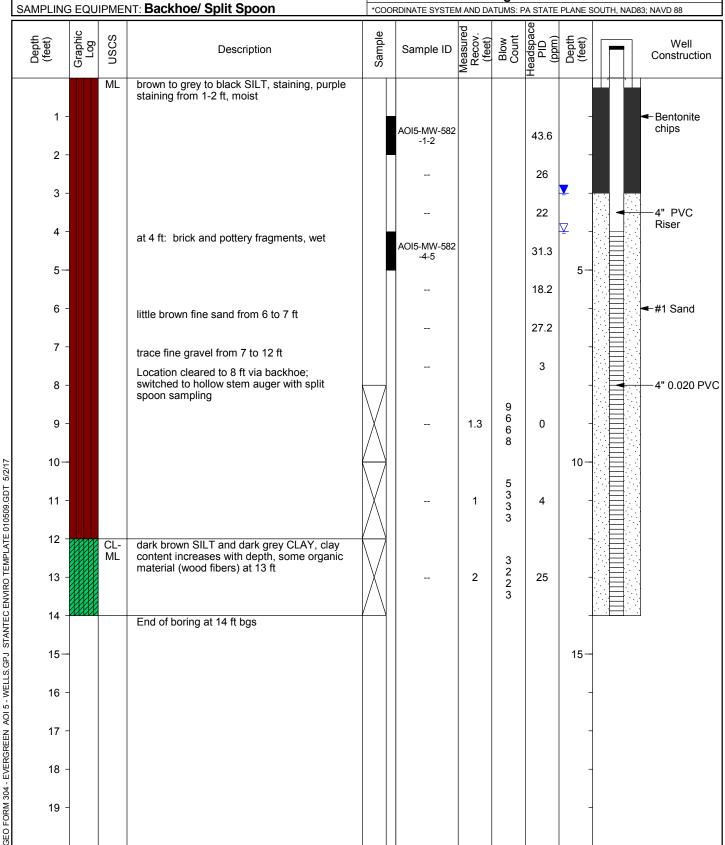
PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec** LOCATION: AOI 5 MW-580 PAGE 1 OF 1 PROJECT NUMBER: 213402567 *NORTHING (ft): 183048.15 *EASTING (ft): 2620438.85 DRILLING: STARTED 6/16/16 COMPLETED: 6/24/16 *GROUND ELEV (ft): 18.21 *TOC ELEV (ft): 20.7 INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 7 BOREHOLE DEPTH (ft): 18 DRILLING COMPANY: HT Sweeney / Total Quality Drilling STATIC DTW (ft): 5.5 WELL DEPTH (ft): 16 DRILLING EQUIPMENT: BackHoe/Holemaster WELL CASING DIAMETER (in): 4 BOREHOLE DIAMETER (in): 10 DRILLING METHOD: Backhoe/Split Spoon/HSA LOGGED BY: D. Downing CHECKED BY: A. Patel



PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec** LOCATION: AOI 5 MW-581 PAGE 1 OF 1 PROJECT NUMBER: 213402567 *NORTHING (ft): 182004.86 *EASTING (ft): 2620861.33 DRILLING: STARTED 6/17/16 COMPLETED: 6/23/16 *GROUND ELEV (ft): 8.58 *TOC ELEV (ft): 11.21 INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 6 BOREHOLE DEPTH (ft): 14 DRILLING COMPANY: HT Sweeney / Total Quality Drilling STATIC DTW (ft): 6.5 WELL DEPTH (ft): 13 DRILLING EQUIPMENT: BackHoe/Holemaster WELL CASING DIAMETER (in): 4 BOREHOLE DIAMETER (in): 10



PROJECT: Marcus Hook Industrial Complex WELL / PROBEHOLE / BOREHOLE NO: **Stantec** LOCATION: AOI 5 PAGE 1 OF 1 MW-582 PROJECT NUMBER: 213402567 *NORTHING (ft): 181709.53 *EASTING (ft): 2621248.54 DRILLING: STARTED 6/16/16 COMPLETED: 6/23/16 *GROUND ELEV (ft): 11.05 *TOC ELEV (ft): 13.88 INSTALLATION: STARTED COMPLETED: INITIAL DTW (ft): 4 BOREHOLE DEPTH (ft): 14 DRILLING COMPANY: HT Sweeney / Total Quality Drilling STATIC DTW (ft): 3 WELL DEPTH (ft): 14 DRILLING EQUIPMENT: BackHoe/Holemaster WELL CASING DIAMETER (in): 4 BOREHOLE DIAMETER (in): 10 DRILLING METHOD: Backhoe/Split Spoon/HSA LOGGED BY: **D. Downing** CHECKED BY: A. Patel



PROJECT: Marcus Hook Industrial Complex LOCATION: AOI 5

PROJECT NUMBER: 213402567

DRILLING: STARTED 6/15/16 CO

INSTALLATION: STARTED

STARTED **6/15/16** COMPLETED: **6/20/16** STARTED COMPLETED:

DRILLING COMPANY: HT Sweeney / Total Quality Drilling

DRILLING EQUIPMENT: BackHoe/Holemaster
DRILLING METHOD: Backhoe/Split Spoon/HSA
SAMPLING EQUIPMENT: Backhoe/ Split Spoon

WELL / PROBEHOLE / BOREHOLE NO:

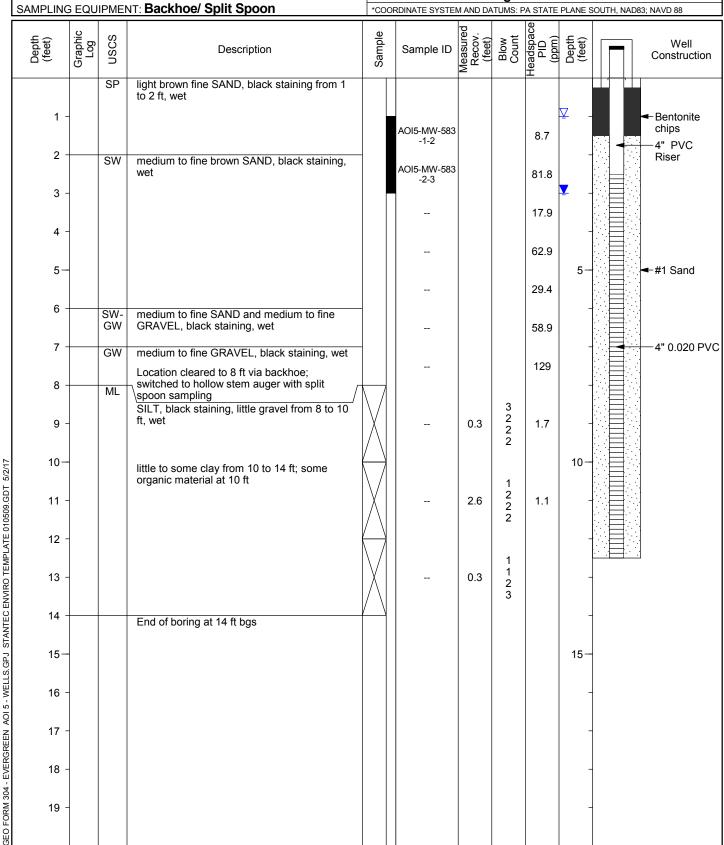
PAGE 1 OF 1 **MW-583**

*NORTHING (ft): 182972.58
*GROUND ELEV (ft): 6.25
INITIAL DTW (ft): 1
STATIC DTW (ft): 3

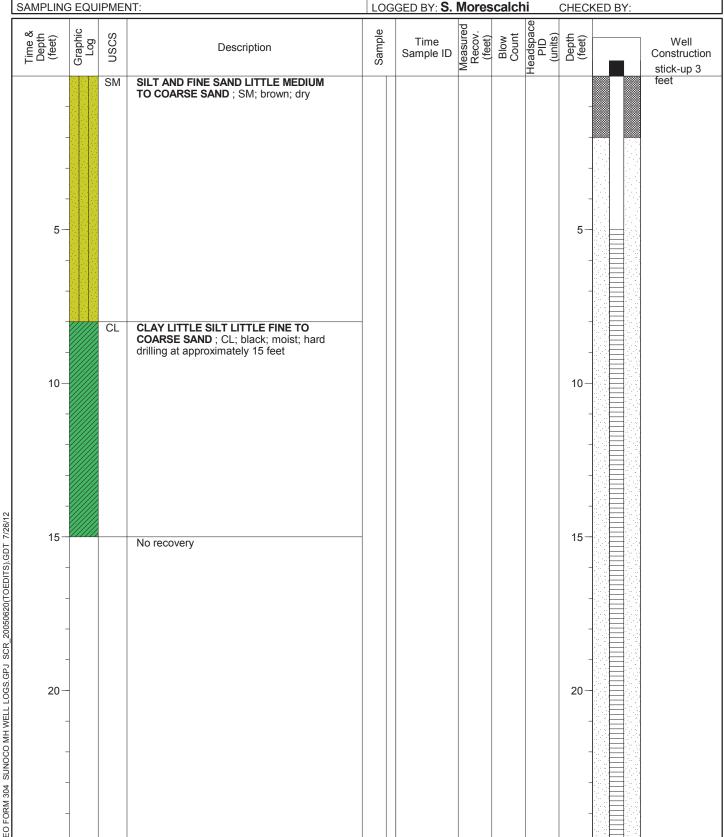
WELL CASING DIAMETER (in): 4 LOGGED BY: **D. Downing**

*EASTING (ft): 2622778.53
*TOC ELEV (ft): 8.93
BOREHOLE DEPTH (ft): 14
WELL DEPTH (ft): 12.5
BOREHOLE DIAMETER (in): 10
CHECKED BY: A. Patel

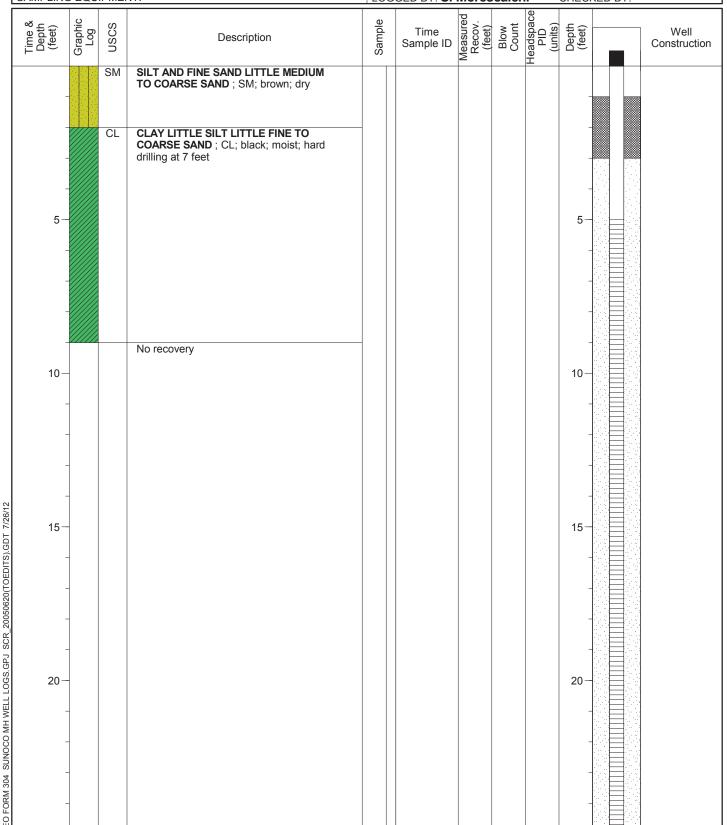
Stantec



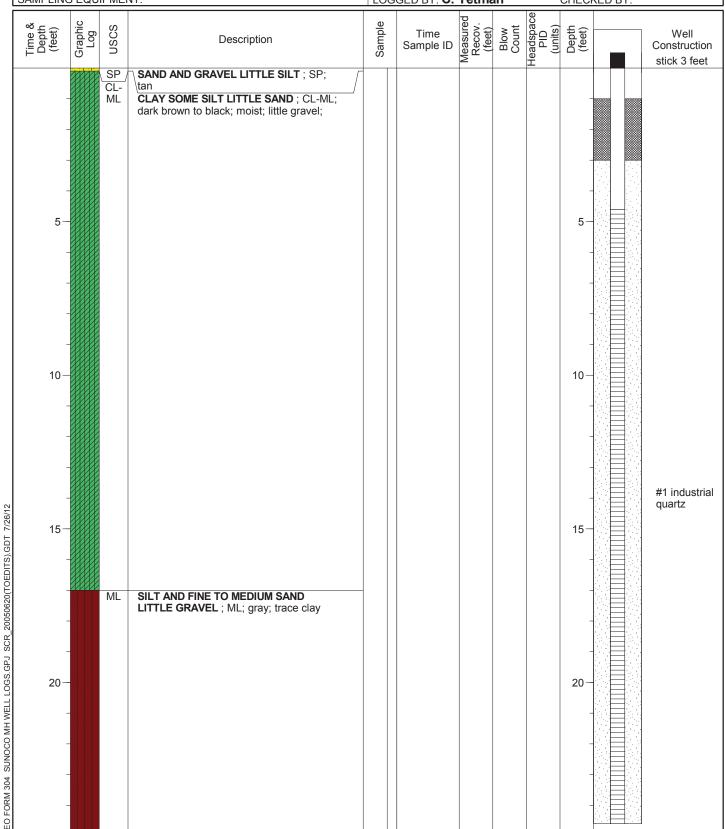
PROJECT: Marcus Hook Refinery, DE Seep WELL / PROBEHOLE / BOREHOLE NO: LOCATION: Sunoco OW-13 PAGE 1 OF 1 PROJECT NUMBER: 62SU.01099.05 SECOR NORTHING (ft): EASTING (ft): STARTED 8/10/05 **COMPLETED: 8/10/05** DRILLING: LATITUDE: LONGITUDE: **COMPLETED: 8/10/05** INSTALLATION: STARTED 8/10/05 GROUND ELEV (ft): TOC ELEV (ft): **DRILLING COMPANY: Parratt-Wolff** INITIAL DTW (ft): N/A BOREHOLE DEPTH (ft): 25.0 DRILLING EQUIPMENT: STATIC DTW (ft): N/A WELL DEPTH (ft): 25.0 DRILLING METHOD: hollow stem auger WELL CASING DIAMETER (in): 4 BOREHOLE DIAMETER (in):8 SAMPLING EQUIPMENT: LOGGED BY: S. Morescalchi CHECKED BY:



PROJECT: Marcus Hook Refinery, DE Seep WELL / PROBEHOLE / BOREHOLE NO: LOCATION: Sunoco OW-14 PAGE 1 OF 1 PROJECT NUMBER: 62SU.01099.05 SECOR NORTHING (ft): EASTING (ft): STARTED 8/11/05 COMPLETED: 8/11/05 DRILLING: LATITUDE: LONGITUDE: **COMPLETED: 8/11/05** INSTALLATION: STARTED 8/11/05 GROUND ELEV (ft): TOC ELEV (ft): **DRILLING COMPANY: Parratt-Wolff** INITIAL DTW (ft): N/A BOREHOLE DEPTH (ft): 25.0 DRILLING EQUIPMENT: STATIC DTW (ft): N/A WELL DEPTH (ft): 25.0 DRILLING METHOD: hollow stem auger/ air rotary WELL CASING DIAMETER (in): 4 BOREHOLE DIAMETER (in):8 SAMPLING EQUIPMENT: LOGGED BY: S. Morescalchi CHECKED BY: Well Description Construction



PROJECT: Marcus Hook Refinery, DE Seep WELL / PROBEHOLE / BOREHOLE NO: LOCATION: Sunoco OW-15 PAGE 1 OF 1 PROJECT NUMBER: 62SU.01099.05 SECOR NORTHING (ft): EASTING (ft): STARTED 8/2/05 COMPLETED: 8/2/05 DRILLING: LATITUDE: LONGITUDE: INSTALLATION: STARTED 8/2/05 COMPLETED: 8/2/05 GROUND ELEV (ft): TOC ELEV (ft): **DRILLING COMPANY: Parratt-Wolff** INITIAL DTW (ft): N/A BOREHOLE DEPTH (ft): 25.0 DRILLING EQUIPMENT: STATIC DTW (ft): N/A WELL DEPTH (ft): 24.6 DRILLING METHOD: hollow stem auger WELL CASING DIAMETER (in): 4 BOREHOLE DIAMETER (in):8 SAMPLING EQUIPMENT: LOGGED BY: C. Yetman CHECKED BY:



Hole terminated at 25 feet.



Project SUN: MARCUS HOOK REF. Owner SUN COMPANY INC. Location MIDDLE CREEK AREA Permit No. N/A Well number __SB-5/VP-1 Total Depth 12 FT Diameter 2 IN. Casing Elevation N/A Water Level: Initial 11 FT. Static N/A Screen Dia. 2 IN. 9 FT. Slot Size 0.02 IN. Length_ Casing Dia.__ 2 IN. 3FT Type_SCH 40 PVC Drilling Method Hollow Stem Auger Sample Method SPLIT SPOON Completion Details FLUSH MOUNTED MANHOLE Driller B.L. MYERS BROS., INC. Log By E.S.

S	ketch Ma		SB-7 *
S	3-2		<u> </u>
Road			VP-3
ă	VP-4		SB-5/
			VP-1
		Sludge Basins	SB-4 *
			VP-2 *

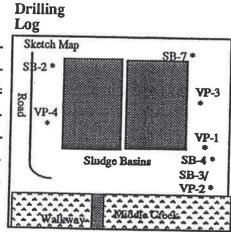
					Date
Depth (feet)	Sample No.	Well Cons		Blow Count	Lithology
 					FILL Black silty sand with fill material/ subangular pebble dry, moderate odor
-			336		Black silty clay/fill material, moist, strong odor
- 5 -	1		972	4-4-7	CLAY Black silty clay - moist - odor
	2		272	2-1-1-2	
1	3		1680	5-7-6- 9	Black silty clay Initial Water at 9 feet
10	4			4-4-5-7	Dark gray clay
3	5		375	6-9-8-4	· · · · · · · · · · · · · · · · · · ·
15 —	6			8-11-9-6	
17		l	0	1	#S
					BORING COMPLETED AT 17 FEET
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+					AOI-5
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Date 2 FEB 93





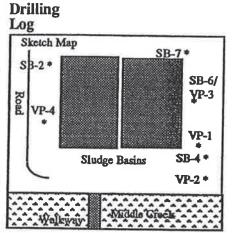
Project SUN: MARCUS HOOK REF. Owner SUN COMPANY INC. MIDDLE CREEK AREA Location _ Permit No. SB-3/ VP - 2 Well number . Total Depth 12 FT Diameter 7.625 IN. Casing Elevation_ N/A Water Level: Initial 7 Fr. Static N/A 2 IN. Screen Dia. __ 9 FT. Slot Size 0.02 IN. Casing Dia. 2 IN. Type SCH 40 PVC Length_ Drilling Method Hollow Stem Auger Sample Method __ SPLIT SPOON Completion Details FLUSH MOUNTED MANHOLE



Driller_B	L MYEI	RS BROS.	, INC.	Log By	B.S.	Date_1	FEB 93	Wa	(kŵaŷa	Middlet	Med
Depth (feet)	Sample No.	Well Const.	OVM (ppm)	Blow Count				Litholog	y		
	Cel Record Price				FILL		Dark brown material	wn silty ma	terial with	h subangul	ar pebbles, fill
-	*		5		١,						::
- 5 -	1		10	4-5-6-10	'CLAY		Tan silty o	lay with rec	i brown N	IAPL, stron	ig odor
	2			19-29-29-10	Y	Initial W	ater at 7 Feet		- ;		
FF	3		9	3-2-3-4			Dark gray	silty clay	ĺ,		
10 -					PBAT		Brown pea	t, organic m	aterial		
12 -			1		CLAY	55.6	Dark brown Brown peat				
F +					CLAY		Dark gray				
15											
F -			3	-			Dark black				
Εđ			1				BORING C	OMPLETE	D AT 17	PEET	
F -											
									19		
			1								
									1		



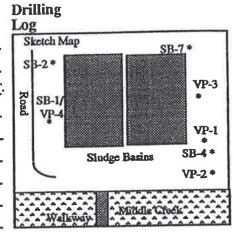
Project SUN: MARCUS HOOK REF. Owner SUN COMPANY INC. Location MIDDLE CREEK AREA Permit No. __ Well number _ SB-6/ VP - 3 Total Depth 12 FT Diameter 7.625 IN. Casing Blevation_ Water Level: Initial 9 FT. Static N/A 2 IN. 9 PT. Slot Size 0.02 IN. Screen Dia._ 2 IN. Type SCH 40 PVC Casing Dia.__ Length_ Drilling Method Hollow Stem Auger SPLIT SPOON Sample Method FLUSH MOUNTED MANHOLE Completion Details_ Driller B.L. MYERS BROS., INC. Log By R.S.



Depth (feet)	Sample No.	Well Const.	OVM (ppm)	Blow Count		Lithology
	men n				FILL	Dark brown silty material with subangular pebbles, fi
			0	:(4):	CLAY	Black silty clay - moist
 - s -	1 -			6-4-2-1	s i	
= =	2		7	3-3-6-9 i	ge g /	Block silty alou / was a silt to
- 1	3			8-8-11-12	Initial Wat	Black silty clay / unconsolidated gravel - moist - strong odor er at 9 Feet
- 10 -						
	.4			9-6-6-5	GRAVEL	Tan / gray silty clay Dark unconsolidated gravel - odor noted
	5 :			7-8-9-10	GRAVEL	States - Grapt Hotel
- 15 —	.			.	2	Unconsolidated gravel intermixed with silt and sand
	3			1	CLAY	Dark gray clay
-						BORING COMPLETED AT 17 FEET
		1				
-						
]				1		
-						
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Project SUN: MARCUS HOOK REF. Owner SUN COMPANY INC. Location MIDDLE CREEK AREA Permit No. ___ Diameter 7.625 FT. Total Depth 12 FT SB-1/VP-4 Well number Water Level: Initial 10 FT. Static N/A Casing Elevation_ 12 FT. Slot Size 0.02 IN. 2 IN. Length_ Screen Dia._ 3 FT Type SCH 40 PVC 2 IN. Length_ Casing Dia.__ Drilling Method Hollow Stem Auger Sample Method ___ Completion Details FLUSH MOUNTED MANHOLE Driller B.L. MYERS BROS., INC. Log By E.S. Date 1 FEB 93



Depth (feet)	Sample No.	Well Const.	OVM (ppm)	Blow Count	Lithology
	9 (84°		18		FILL Brown silty sand with fill material, dry Dark gray silty sand with fill material, dry, petroleum odor
 - 5 -	1		12	15-13-10-8	i i i i i i i i i i i i i i i i i i i
	31 gr				SILT Plack classes silt maist odar
	.2 3		31 93	12-8-10-0 32-24-14-8	Black clayey silt, moist, odor Initial Water at 10 Feet
- 10 - 	4			12-13-10-11	GRAVEL Poorly sorted gravel, saturated with red-brown NAPL
			10		CLAY Brown silty clay with red-brown NAPL
15 	s				
					BORING COMPLETED AT 17 FEET
					7
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